mi Sanders

A GEC-MARCONI ELECTRONICS COMPANY

SWEEP OSCILLATOR

Type 6700A

INSTRUCTION MANUAL

MP MASTER

MA23597

MARCONI INSTRUMENTS LTD
SANDERS DIVISION STEVENAGE

TABLE OF CONTENTS

Paragraph	Title	Page
	SECTION 1 GENERAL INFORMATION	
1.1	Scope of Manual	1-1
1.2	Description	1-2
	SECTION 2 INSTALLATION	
2.1	Unpacking	2-1
2.2	Power Considerations	2-1
2.2.1	Power Source	2-1
2.2.2	Power Cord	2-1
2.3	Operating Temperature Range	2-1
2.4	Rack Bench Conversion	2-1
2.5	Repacking for Shipment	2-2
	SECTION 3 OPERATING INSTRUCTIONS	
3.1	Introduction	3-1
3.2	Front and Rear Panel Familiarization	3-1
3.2.1	Front Panel	3-1
3.2.2.	Rear Panel	3-1
3.3	Operating Considerations	3-1
3.4	Applying Power	3-1
3.5	Sweep Modes	3-1
3.5.1	Automatic	3-1
3.6	Sweep Trigger Selection	3-6
3.6.1	Automatic	3-6
3.6.2	Line	3-6
3.6.3	External	3-6
3.6.4	Single Sweep	3-6
3.7	Sweep Function Modes	3-6
3.7.1	F1-F2 Mode	3-6
3.7.2	M1-M2 Mode (Expanded Sweep)	3-6
3.7.3	SYM-M1 Mode (Symmetrical Sweep)	3-6
3.7.4	CW M1 Mode	3-7
3.7.5	EXT/M1 Mode	3-7
3.8	Sweep Response Time Control	3-7
3.9	RF Level	3-8
3.10	RF Power Levelling	3-8
3.10.1	General Considerations	3-8
3.10.2	Internal Levelling	3-8
3.10.3	External Levelling	3-8
3.10.4	Power Meter Levelling	3-9
3.11	Frequency Markers	3-9
3.12	Blanking During Retrace	3-9
3.13	Amplitude Modulation	3-10
3.13.1	Internal Square Wave	3-10
3.13.2	External AM	3-10
3.13.3	External Pulse	3-10
3.14	Displaying Swept Frequency Measurements	3-10
3.15	Remote Programming of Frequency and Amplitude	3-11
3.15.1	Frequency – Analog Voltage Control	3-11
3.15.2	Frequency – Resistance Control	3-12
3.15.3	Frequency – Digital Control	3-12
3.15.4	RF Amplitude – Voltage and Resistance Control	3-12
3.16	Frequency Modulation	3-13
3.16.1	External FM	3-13
3.16.2	Phase Locking	3-13
	SECTION 4 PRINCIPLES OF OPERATION	
4.1	Introduction	4-1
4.2	Block Diagram Description	4-1
4.3	Circuit Descriptions (Mainframe)	4-2
4.3.1	Sawtooth Oscillator (Sweep and Marker Generator)	4-2
4.3.2	Sweep Limiter (Sweep and Marker Generator)	4-4
4.3.3	Sweep Trigger (Sweep and Marker Generator)	4-6

TABLE OF CONTENTS (cont)

Paragraph	Title	Page
4.3.4	Sweep Amplifiers (Sweep and Marker Generator)	4-6
4.3.4.1	F1-F2/M1-M2 Sweep Mode	4-6
4.3.4.2	Symmetrical Sweep Mode (SYM-M1)	4-7
4.3.4.3	External/M1 Sweep Mode (EXT/M1 Mode)	4-7
4.3.4.4	CW M1 Mode	4-9
4.3.5	Proportional Output (Sweep and Marker Generator)	4-9
4.3.6	Frequency Marker (Sweep and Marker Generator)	4-10
4.3.7	Square Wave Generator (Sweep and Marker Generator)	4-10
4.3.8	Power Supplies	4-11
4.3.8.1	±15 and −10 Volt Supplies	4-11
4.3.8.2	+5 Volt Supply	4-11
4.3.8.3	Bias Supply and Tuning Supply	4-12
	SECTION 5 MAINTENANCE	
5.1	Introduction	5-1
5.2	Required Test Equipment	5-1
5.3	Performance Tests	5-1
5.3.1	Frequency Accuracy	5-1
5.3.2	Power Output (Unlevelled)	5-2
5.3.3	Power Variation (Levelled)	5-4
5.3.3.1	Internal Levelling	5-4
5.3.3.2	External Levelling	5-4
5.3.3.3	Power Meter Levelling	5-5
5.3.4	Sweep Trigger	5-6
5.3.4.1	Automatic	5-6
5.3.4.2	Line Trigger	5-6
5.3.4.3	Single Sweep	5-6
5.3.4.4	External Trigger	5-6
5.3.5	Internal Square Wave	5-7
5.3.5.1	Unlevelled	5-7
5.3.5.2	Levelled	5-7
5.3.6	External AM	5-7
5.3.7	Symmetrical Sweep Width Accuracy	5-8
5.3.8	Residual FM	5-8
5.3.9	Blanking Output	5-9
5.3.10	Marker Video Output	5-10
5.3.11	Pen Lift	5-10
5.3.12	Proportional Sweep Amplitude	5-10
5.4	Calibration Procedures	5-10
5.4.1	Reference Power Supplies	5-10
5.4.2	Dial Mechanism Calibration	5-11
5.4.3	Remote Digital Frequency Programming	5-12A
5.5	Alignment Procedures	5-13
5.5.1	Waveform Generator Alignment	5-13
5.5.2	Marker Alignment	5-13
5.5.3	Internal Square Wave Alignment	5-14
5.6	Servicing	5-14
	SECTION 6 CIRCUIT DIAGRAMS	
6.1	Introduction	6-1
6.2	List of Figures	6-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Marconi Instruments Type 6700A Sweep Oscillator With a Type 6754A RF Unit Installed	1-1
2-1	Conversion for Rack Mounting	2-2
3-1	Front Panel Description	3-2
3-2	Rear Panel Description	3-4
3-3	Swept Frequency Measurement Test Set-Up Using an Oscilloscope Display	3-11
3-4	Swept Frequency Measurement Test Set-Up Using an X-Y Recorder Display	3-11
4-1	Block Diagram of Type 6700A Mainframe and RF Unit	4-1
4-2	Sawtooth Oscillator, Simplified Circuit Diagram	4-3
4-3	Sweep Limiter, Simplified Circuit Diagram	4-4
4-4	Sweep Trigger, Simplified Circuit Diagram	4-5
4-5	Sweep Amplifier (F1-F2/M1-M2 Modes), Simplified Circuit Diagram	4-7
4-6	Sweep Amplifier (SYM M1 Mode), Simplified Circuit Daigram	4-8
4-7	Sweep Amplifier (EXT/M1 Mode), Simplified Circuit Diagram	4-8
4-8	Sweep Amplifier (CW M1 Mode), Simplified Circuit Diagram	4-9
4-9	Proportional Sweep Amplifier, Simplified Circuit Diagram	4-9
4-10	Frequency Marker Generation	4-10
4-11	1 KHz Square Wave Generator	4-11
4-12	±15 Volt and −10 Volt Power Supply Block Diagram	4-12
4-13	+5 Volt Power Supply Block Diagram	4-12
5-1	Frequency Accuracy Measurement Test Setup	5-2
5-2	External Levelling Measurement Test Setup	5-4
5-3	External Levelling Measurement Test Setup (2)	5-5
5-4	Slope Discriminator Display	5-9
5-5	Test Point and Adjustment Locations, Assembly A5	5-11
5-6	Dial Mechanism Calibration Settings	5-12
5-7	Identification of Main Assembly Components Located on Front and Back Panels	5-15
6-1	Assembly A4, Motherboard Component Location	6-2
6-2	Type 6700A Overall Circuit Diagram	6-3/6-4
6-3	Assembly A1, Sweep and Marker Generator Component Identification	6-6
6-4	Sawtooth Oscillator Circuit Diagram (part of A1)	6-7/6-8
6-5	Sweep Amplifier Circuit Diagram (part of A1)	6-9/6-10
6-6	Marker and Square Wave Generator Circuit Daigram (part of A1)	6-11
6-7	Assembly A2, Power Supply Component Identification	6-12
6-8	Assembly A2, Power Supply Circuit Diagram	6-13
6-9	Assembly A3, Remote Programming Component Location	6-14
6-10	Assembly A3, Remote Programming Circuit Diagram	6-15/6-16

LIST OF TABLES

Number	Title	Page
1-1	Specifications	1-0
1-2	RF Plug-In Units	1-2
5-1	Required Test Equipment for Performance Tests	5-3
5-2	Required Test Equipment for Calibration Procedures	5-3
5-3	Main Assembly Parts List	5-16
5-4	Assembly A1, Sweep and Marker Generator Parts List	5-18
5-5	Assembly A2, Power Supply Parts List	5-23
5-6	Assembly A3, Remote Programming Parts List	5-25
5-7	Assembly A4, Motherboard Parts LIst	5-26
5-8	Assembly A5, Trimmer Board Parts List	5-27

Table 1-1. Specifications *

FREQUENCY
Range, accuracy, linearity and stability are determined by RF Unit installed.

SWEEP FUNCTIONS
Sweep End Limits: Any two frequencies in band set by F1 and F2 controls. Sweeps in either direction from F1 to F2.

Marker End Limits: Any two frequencies in entire band set by M1 and M2 controls.

Symmetrical Sweep: Centre frequency set by either M1 control or an external 10 k-ohm potentiometer. Sweep width adjustable from 0 to 100% of entire band with continuous, uncalibrated control or in nine discrete widths calibrated directly in MHz or GHz, from about 0.25% to 100% of band. Width accuracy is ±3% of sweep width.

External: Direct coupled 10V for full sweep; positive voltage increases output frequency. Response time: 1 msec for full sweep. Provision for external resistance programming. Input impedance 5 k-ohms.

CW Operation: Continuously variable single frequency controlled by position of M1 marker. Externally controllable with either 10 K-ohm potentiometer or an analog voltage between 0 and +10 volts.

MARKERS
Two independent, adjustable calibrated markers displayed either as dips in RF output or externally as video markers. Constant proportion width marker selectable for sharp, bright marking in narrow-width symmetrical displays.

Accuracy: Same as RF Unit frequency accuracy.

Resolution: Better than 0.05% of RF Unit bandwidth.

Amplitude: Continuously variable.

Output: Auxiliary video marker; amplitude −5V. Output impedance 5 K-ohms.

TRIGGERED SWEEP MODES
Automatic: Sweep recurs automatically.

Line: Line frequency triggers sweep.

External: −10 V input initiates sweep.

Single Sweep: Front panel momentary switch starts sweep.

SWEEP RATES
Automatic: Four decade ranges continuously adjustable from 0.01 sec/sweep to 100 sec/sweep. Vernier has 10 to 1 range.

Manual: Three-quarter-turn control for sweep between limits set in either end-limit or symmetrical sweep mode.

Sweep Dwell Time: Delay at start to allow RF power level to stabilize. Also, delay at end of sweep.

SWEEP OUTPUT
Direct-coupled, constant amplitude sawtooth adjustable from +2 to +10 V peak, concurrent with swept RF output. Sweep lamp lights only during forward sweep.

PROPORTIONAL OUTPUT
Switchable between:

a. Direct-coupled voltage proportional to instantaneous frequency. 0 V at low end and 10 V at high end of band.

b. Direct coupled voltage proportional to instantaneous frequency. 0 V at low end and 40 V/ octave at high end of band.

BLANKING
Operation: RF automatically attenuated during retrace to provide base line except when disabled with rear panel switch.

Output: Direct-coupled-5V pulse; impedance 5 K-ohms.

PEN LIFT OUTPUT
Relay contact closure during forward-trace portion of sweep.

RF OUTPUT
Levelling: With internal levelling, power variation is as indicated for RF unit. With an external directional coupler and detector, the internal feedback amplifier maintains output power variation to within ±0.1 dB, plus coupler and detector variation. Provision for power meter levelling from + or − meter output. Levelling input impedance is 1 K-ohms.

Amplitude: RF level controlled from front panel or with external 10 K-ohm potentiometer or an analog input voltage.

RF Level On/Off: Front panel switch permits complete RF cut off. Rear panel binary input permits remote control.

MODULATION
Amplitude Modulation:
Internal: Square wave adjustable from 950 to 1050 Hz with rise time of 2 μsec maximum. On/off ratio greater than 40 dB, except 0.4–1.2 GHz and 1–2 GHz ranges (20 dB).

External: +10 V signal increases RF output to rated level with RF level control set at minimum. Rise and fall time <1.0 μsec unlevelled and levelled. Source impedance, 10 K-ohms.

Frequency Modulation: Direct-coupled wide-band FM input with maximum deviation rate determined by RF unit.

Pulse: Optional pulse input on rear panel is provided for <50 nsec pulse rise time.

SPURIOUS SIGNALS
60 dB below rated RF output except 2nd harmonic is 20 dB to 8 GHz and 30 dB from 8 to 18 GHz.

GENERAL
Dimensions: H–145mm., W–425mm., D–390mm.

Weight (Mainframe only): Net 11Kg. approximately.

Power Input: 115/230 V ± 10%, 48–62 Hz, approximately 100 VA.

*Type 6700A with any RF Unit installed.

SECTION 1
GENERAL INFORMATION

1.1 SCOPE OF MANUAL

This manual contains information necessary for understanding the application and operation of the Marconi Instruments Type 6700A Sweep Oscillator (Mainframe). The manual provides a general description, installation information, operation instructions, principles of operation and maintenance information. A complete set of circuit diagrams is also provided to aid in understanding the various modes of operation and proper servicing of the equipment.

The Type 6700A Sweep Oscillator accepts a series of solid-state plug-in RF Units. Figure 1-1 shows the Type 6700A with a Type 6754A RF Unit installed. Although reference to controls, indicators and connectors located on the RF unit are used frequently throughout the following sections, this manual does not contain a detailed discussion of the RF Unit. Refer to the applicable RF Unit instruction manual for specifications, operating instructions and maintenance information for a specific RF Unit.

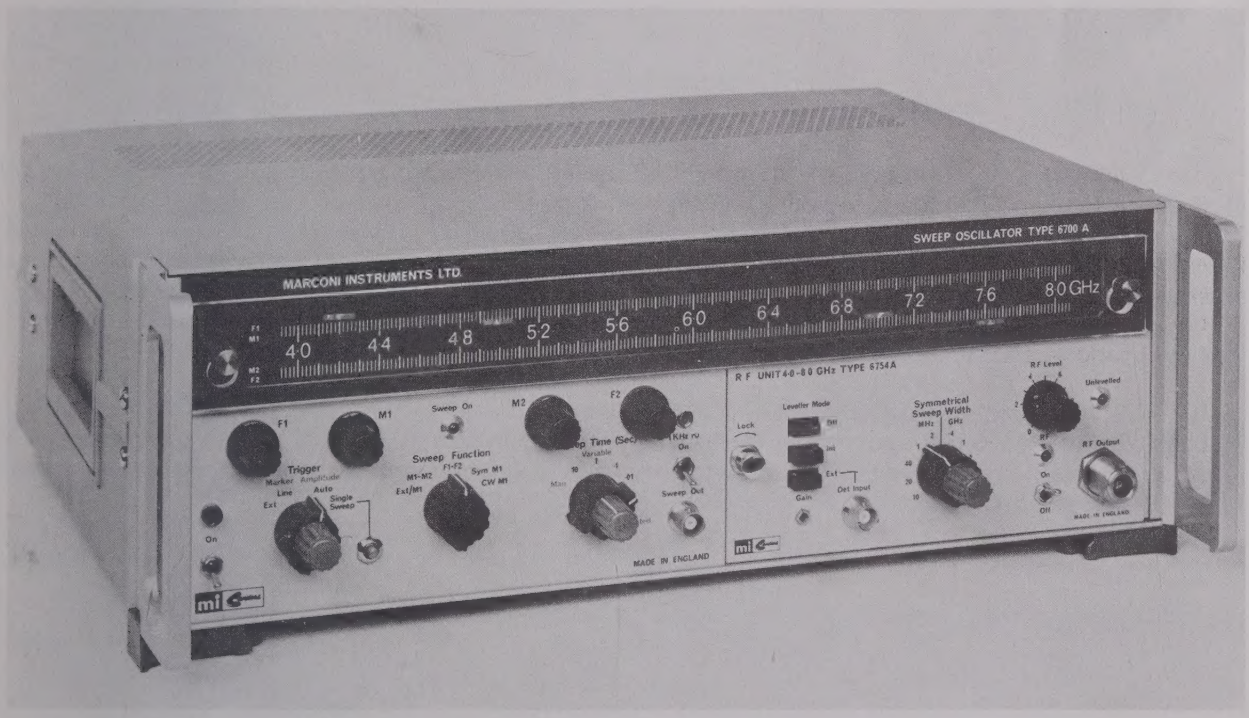


Figure 1-1. Marconi Instruments Type 6700A Sweep Oscillator With a Type 6754A RF Unit Installed

1.2 DESCRIPTION

The Marconi Instruments Type 6700A is a solid-state, high performance Microwave Sweep Oscillator featuring plug-in versatility and multi-band operation capability. The Type 6700A and its series of RF Units provide a sweepable range of 0.4 to 18 GHz. A plug-in RF Unit is an integral part of the sweep oscillator circuitry and must be installed in the front panel compartment of the Type 6700A to achieve operation. Available RF Units covering seven frequency ranges are shown in Table 1-2. All basic RF Units are designed for external levelling. Optional RF Units with either internal or no levelling are also available.

Table 1-2. RF Plug-In Units

Marconi Instruments Type	Frequency Range (GHz)
6722A	0.4 to 1.2
6730A	1 to 2
6738A	1.7–4.3
6742A	2 to 4
6754A	4 to 8
6766A	8 to 12.4
6774A	12.4 to 18

With an RF Unit installed, the Type 6700A becomes a versatile electronically tunable sweep source of precision RF signals suitable for testing and calibration of RF components and systems. This high performance sweep oscillator provides stable coverage down to 400 MHz, with exceptionally low spurious and harmonic content, and provides continuous coverage up to 18 GHz. It provides four sweep modes: automatic, external, single and manual. The automatic, external and single are adjustable in sweep time from 0.01 to 100 sec/sweep. Other performance features include superior frequency accuracy, high FM rates for phase lock applications, and symmetrical sweep widths of from 0 to 100% of the frequency bands.

The all solid-state design of the Type 6700A, including the oscillators, makes it a light weight unit that provides convenient portability for field operations. Since each RF Unit covers a specific frequency range, a separate high resolution, 350 mm. frequency scale is provided with each unit. These scales are keyed to the mainframe to ensure accurate positioning.

SECTION 2
INSTALLATION

2.1 UNPACKING

The Marconi Instruments Type 6700A Sweep Oscillator is shipped in a specially designed carton with shock-absorbing packing material between the instrument and the carton. Use normal care when unpacking the instrument and removing the packing material. Do not destroy the carton or packing material until the equipment is thoroughly inspected. If damage is found, notify the carrier immediately and do not destroy any packing material until an agent of the carrier has examined it.

2.2 POWER CONSIDERATIONS

2.2.1 Power Source

The Type 6700A may be operated from an AC source of 115 or 230 volts (±10%), at 48 to 62 Hz. With the instrument power cord disconnected, move the Line Voltage Selector switch (located on the rear panel), having first removed the transparent locking plate, to the desired voltage range. Replace the transparent locking plate, appropriately oriented. Fuse F1 located on the rear panel must be 3.15 amperes for 115 volts operation or 1.6 amperes for 230 volts operation. Fuses should be "anti-surge" types.

2.2.2 Power Cord

The Type 6700A is supplied with a detachable, three-conductor power cord. This power cord, when plugged into an appropriate receptacle, grounds the instrument cabinet.

2.3 OPERATING TEMPERATURE RANGE

The Type 6700A is designed to operate within its specifications when the ambient temperature is between −10° C and +50° C. Operating in ambient temperatures beyond these limits could affect the accuracy of the instrument and cause damage to its circuits and the R.F. oscillator.

2.4 RACK BENCH CONVERSION

The Type 6700A is shipped as a bench-type instrument. For bench use the unit is conveniently raised on its four plastic feet. A self-storing tiltstand may be locked into position to raise the front panel for improved viewing.

To prepare the unit for rack mounting, refer to Figure 2-1. Rack adapters are available as an Accessory Kit.

2.5 REPACKING FOR SHIPMENT

To protect the unit during reshipment always use the best packaging methods available. When possible, use the original packing container and cushioning material. Make certain the plug-in RF Unit is securely locked in position and held there by cushioning material, if installed in the Mainframe during shipment. If the original packing materials are not available, use the following procedure:

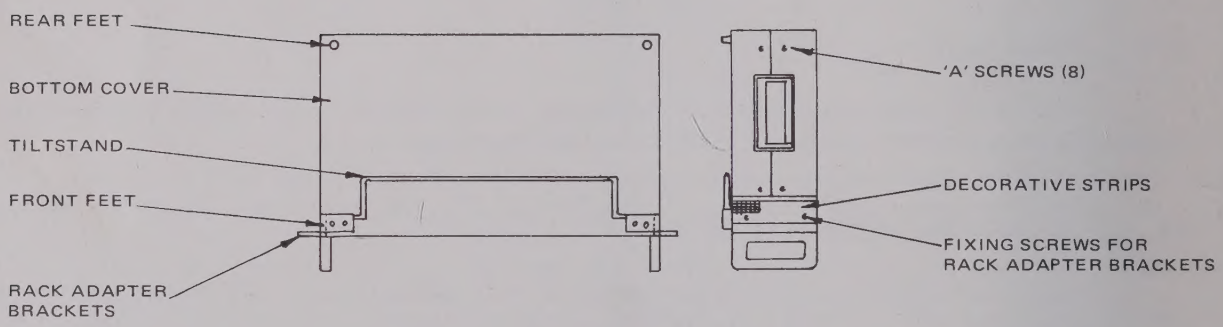
a. Wrap instrument in sturdy paper or plastic.

b. Place wrapped instrument in a strong shipping container; use a ¾-inch layer of shock absorbing material around all sides of the unit to provide a firm cushion and prevent movement inside the container.

c. Thoroughly seal shipping container and mark it as "FRAGILE".

d. If shipping for service attach a note to indicate:

1. Service required.
2. Description of malfunction.
3. Type and Serial numbers.
4. Return address.
5. Authorization to conduct repairs.



TO PREPARE UNIT FOR RACK MOUNTING

1. UNDO SCREWS A (8 OFF) REMOVE LOWER COVER
2. REMOVE REAR FEET, FRONT FEET, AND TILTSTAND
3. REPLACE LOWER COVER
4. REMOVE DECORATIVE STRIP FROM FRONT HANDLE BRACKET AND FIT RACK ADAPTOR BRACKET

Figure 2-1. Conversion for Rack Mounting

SECTION 3
OPERATING INSTRUCTIONS

3.1 INTRODUCTION

This section provides a detailed description of the Type 6700A Sweep Oscillator's operating controls, indicators and connectors, and contains the procedures for operating the instrument. This section also describes the controls and indicators located on the RF Unit. (Refer to the applicable RF Unit Instruction Manual for a detailed description of the unit.)

The Type 6700A, a versatile RF signal source of both swept and static frequencies, provides four sweep modes: automatic, single, manual and external. The Mainframe and seven basic RF units (See Table 1-2) provide a continuous range of coverage from 0.4 to 18 GHz.

3.2 FRONT AND REAR PANEL FAMILIARIZATION

3.2.1 Front Panel

Figure 3-1 illustrates and explains the function of all front panel fixtures for both the Mainframe (encircled numbers) and an RF Unit (encircled letters). Additional information regarding the proper use of the controls is provided in paragraphs 3.3 through 3.15.

3.2.2 Rear Panel

The identification and function of connectors and controls located on the rear panel for both the Mainframe (encircled numbers) and an RF Unit (encircled letters) are shown in Figure 3-2.

3.3 OPERATING CONSIDERATIONS

Information regarding operating features of the Type 6700A and of the RF plug-in Unit is provided in the following paragraphs. A complete understanding of these considerations and their effects is recommended before using the instrument as a signal source.

3.4 APPLYING POWER

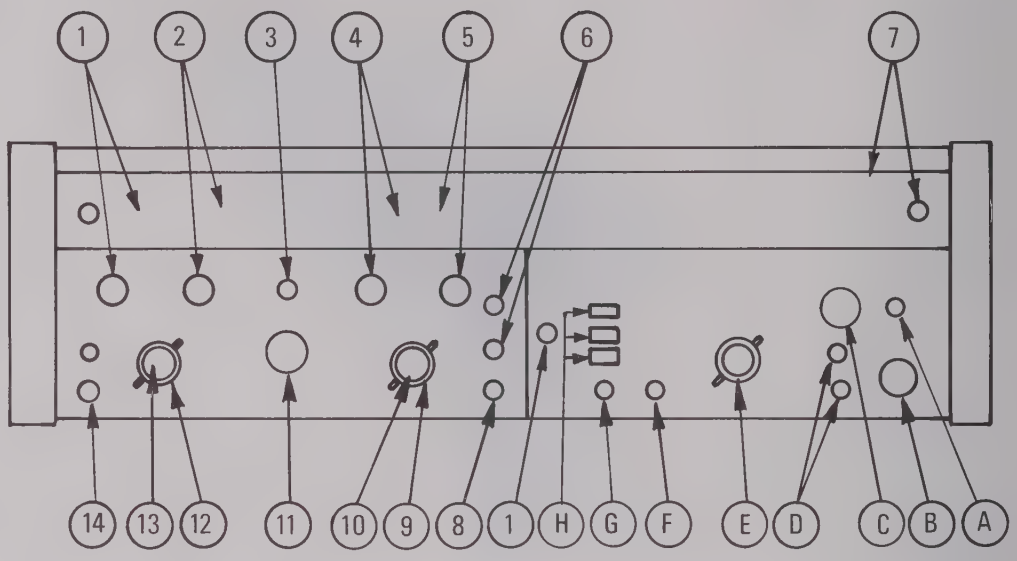
Moving the power switch to the ON position causes the neon indicator to light indicating that the instrument is ready to operate providing an RF Unit is installed. There is no waiting period for operation.

3.5 SWEEP MODES

3.5.1 Automatic

One of four automatic sweep times can be selected by setting the SWEEP TIME (SEC) control to either .01, .1,1, or 10 and setting the SWEEP FUNCTION control to M1-M2, F1-F2 or SYM M1. The SWEEP TIME (SEC) settings are accurate only if the VARIABLE control is set to CALIBRATED

(continued on page 3-6)



(1) **F1 Control and Marker:** Determines starting frequency for F1-F2 setting of SWEEP FUNCTION control and marker frequency in remaining settings except for CW M1 and EXT/M1.

(2) **M1 Control and Marker:** Determines (a) marker frequency for F1-F2, (b) sweep starting frequency for M1-M2, (c) centre frequency for SYM M1, and (d) sweep starting frequency for EXT/M1 positions of SWEEP FUNCTION control.

(3) **SWEEP ON:** Indicator lights during forward trace of internally generated sweep, but is inoperative on manual sweep mode and on EXT/M1 Mode.

(4) **M2 Control and Marker:** Determines (a) second marker frequency for F1-F2, (b) the only marker frequency for EXT/M1, and (c) sweep limit frequency for M1-M2 positions of SWEEP FUNCTION control.

(5) **F2 Control and Marker:** Determines (a) sweep limit frequency for F1-F2, and (b) marker frequency for both M1-M2 and SYM M1 settings of SWEEP FUNCTION control.

(6) **1KHz ⊓⊔ ON Switch and Adjustment:** Controls voltage to square wave generator; adjustment varies frequency of square wave.

Figure 3-1. Front Panel Description

(7) **Frequency Scale and Retaining Screws:** 350 mm scale (one per RF Unit). Keyholes in scale locate over screws on front panel.

(8) **SWEEP OUT:** Connector provides a linear dc ramp voltage for driving the horizontal axis of oscilloscopes and chart recorders.

(9) **SWEEP TIME (SEC):** Selects one of four sweep times; also selects manual mode.

(10) **SWEEP TIME (SEC) VARIABLE:** Vernier provides adjustment of selected sweep time. Fully anticlockwise setting increases sweep time by a factor of 10. In the Manual mode, the vernier is used to vary the sweep manually.

(11) **SWEEP FUNCTION:** Selects an internal mode, CW or external frequency (voltage) command.

(12) **TRIGGER:** Selects either AUTO, LINE or EXT mode for generating the sweep.

(13) **MARKER AMPLITUDE:** Provides continuous amplitude adjustment for video and RF markers.

(14) **SUPPLY ON:** Controls ac line power; up for ON. Neon indicator immediately above.

(A) **UNLEVELLED:** Indicator lights when RF output is not levelled across the entire frequency range in use.

(B) **RF OUTPUT:** Connector provides RF OUTPUT signal.

(C) **RF LEVEL Control:** Knob sets amplitude of RF OUTPUT.

(D) **RF ON-OFF Switch and Indicator:** Controls V_{cc} to RF Unit; indicator lights when RF Unit is operating.

(E) **SYMMETRICAL SWEEP WIDTH Control:** Select one of nine calibrated sweep widths. Vernier provides adjustment of the sweep width in 0—100% position only.

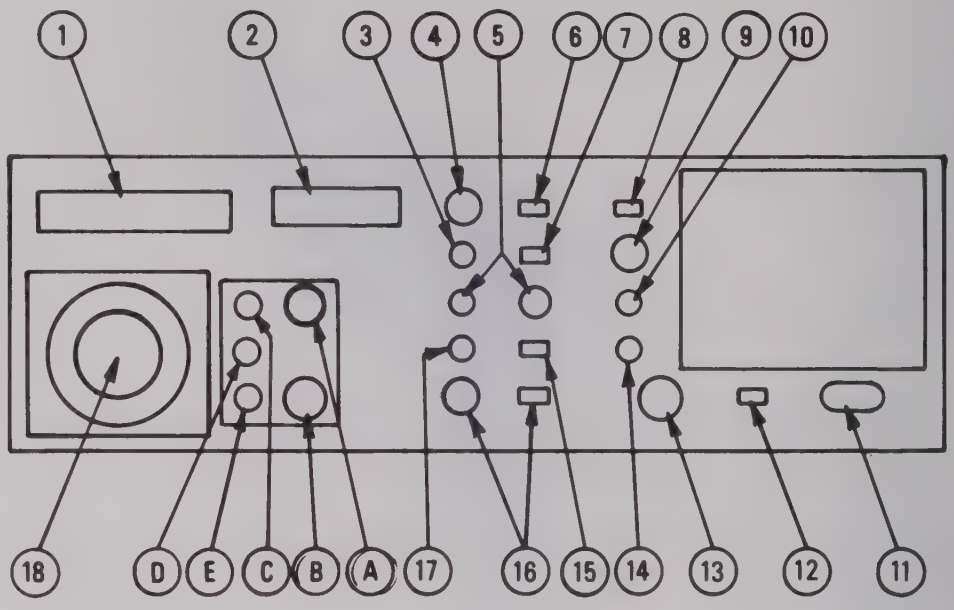
(F) **EXT DET INPUT:** Input connector for external levelling signal.

(G) **GAIN:** Adjustment controls Leveller gain in the Power Meter mode.

(H) **LEVELLER MODE Controls:** Select one of three basic modes of operation: OFF, INTernal or EXTernal. (Internal levelling available only with —1 option.

(I) **LOCK:** Captive screw secures RF Unit in Mainframe.

Figure 3-1. Front Panel Description (Cont.)



(1) **TB1:** Terminals 1 and 2, 4 and 5, 8 and 9, 10 and 11, are normally shorted. Terminals 6 to 11 are for remote frequency control.

(2) **REMOTE PROGRAMME INPUT:** Input connector for remote digital BCD control of output frequency and remote RF ON/OFF Control.

(3) **BLANKING OUTPUT:** Connector provides a negative pulse during retrace and prior to initiation of next trace.

(4) **EXT SWEEP INPUT:** Input connector for 0 to +10 volt input sweep command.

(5) **DISPLAY SWEEP OUTPUT and AMPLITUDE:** Output is identical to front panel SWEEP OUT; control adjusts amplitude of both front and rear panel SWEEP OUTPUT signals.

(6) **SWEEP RESPONSE TIME:** Switch controls bandwidth of tuning supply. In AUTO the bandwidth is automatically adjusted according to rate of change of the input voltage; in FAST the bandwidth always remains at its widest.

Figure 3-2. Rear Panel Description

(7) **RF DURING TRACE:** Switch provides a choice of RF ON or OFF during retrace.

(8) **SYM MARKERS:** Switch selects CALIBRATED MARKERS, read from the frequency scale, or RELATIVE markers of constant narrow width in SYM M1 mode.

(9) **PEN LIFT:** Terminal provides a relay closure signal during forward trace.

(10) **EXT SQUARE WAVE:** Input connector for external square-wave modulation of RF; −10 volts turns off RF power.

(11) **LINE INPUT:** 3-wire male connector.

(12) **Line Voltage:** Switch selects 115V or 230V operation.

(13) **Power Line Fuse:** 115V/3.15A or 230V/1.6A. Anti-surge fuses, 20mm x 5mm.

(14) **EXTERNAL TRIGGER:** Connector for −10 volt input trigger signals.

(15) **RF MARKER:** Switch provides amplitude dips on the RF output.

(16) **PROPORTIONAL OUTPUT and Switch:** Connector provides a voltage proportional to the frequency of the instantaneous RF output. Switch selects either 10V/BAND or 40V/OCTAVE scale factor for the proportional output voltage.

(17) **VIDEO MARKER OUTPUT:** Connector provides a negative signal when the RF and marker frequencies coincide. RF MARKER switch does not affect this output.

(18) **COOLING FAN:** Blows cold air on to RF Unit heat sink.

(A) **J1:** Input connector for a remote tuning input.

(B) **RF OUTPUT:** This connector only present on RF Units with "R" option.

(C) **AM INPUT:** Input connector for amplitude modulation signals.

(D) **FM INPUT:** Input connector for frequency modulation and phase locking signals.

(E) **PULSE INPUT:** Input connector for pulse signals which provide a rise and fall time <50 ns. (Only available with the −03 option.)

Figure 3-2. Rear Panel Description (Cont.)

(fully clockwise). Rotating the VARIABLE control from fully clockwise to fully anti-clockwise increases the sweep time from one to ten times the interval indicated (.01, .1, 1, or 10) with a maximum sweep time of 100 seconds. The SWEEP ON indicator will light during the forward sweep.

3.6 SWEEP TRIGGER SELECTION

3.6.1 Automatic

With the TRIGGER selector set to AUTO, the sweep is automatically re-started upon completion of a retrace, i.e. recurrent free-running operation. A short dwell time is provided at the start and finish of each trace to allow RF frequency and power to stabilise.

3.6.2 Line

In the LINE position, a sweep is triggered by the occurrence of the next line frequency cycle following completion of retrace.

3.6.3 External

Setting the TRIGGER selector to EXT allows a −10 volt signal, applied to the EXTERNAL TRIGGER connector on the rear panel, to trigger a new sweep upon receipt of the next negative going external trigger signal following completion of retrace.

3.6.4 Single Sweep

Rotating the TRIGGER selector fully clockwise and pressing the adjacent push-button switch generates a single sweep. A second manual sweep can be initiated by pressing the push-button again following completion of retrace.

3.7 SWEEP FUNCTION MODES

3.7.1 F1-F2 Mode

With the SWEEP FUNCTION selector set to F1-F2, the output frequency sweeps between the limits set by the F1 and F2 controls. Normally the low frequency limit is set by F1 and the high limit by F2, resulting in a sweep that goes from a low to a higher frequency. However, F1 can be used to set the high limit and F2 for the low limit, thereby establishing a high to low frequency sweep.

Two calibrated markers are controlled by the M1 and M2 controls, each continuously adjustable over the entire frequency range.

3.7.2 M1-M2 Mode (Expanded Sweep)

The M1 and M2 markers provide the means of selecting any portion of the F1-F2 frequency range for expanded display. With the SWEEP FUNCTION selector set to M1-M2, the frequency range established by the two markers becomes the full width of the swept frequency display. F1 and F2 may be used to provide markers if they are brought within the M1-M2 range.

3.7.3 SYM-M1 Mode (Symmetrical Sweep)

Setting the SWEEP FUNCTION selector to SYM M1 and adjusting the M1 control to position the M1 marker to the desired frequency will cause the trace to sweep symmetrically about the centre frequency established by M1. The total sweep width (peak-to-peak excursion) is determined by the setting of the SYMMETRICAL SWEEP WIDTH control located on the front panel of the RF Unit.

When the SYM MARKERS switch located on the rear panel is set to CALIBRATED, F1 and F2 markers are directly calibrated by the frequency scale and cover the entire frequency range of the RF Unit. Positioning the SYM MARKERS switch to RELATIVE causes the markers to become quite narrow ranging only over the symmetrical sweep frequency width in use. Frequency scale readings at the markers do not apply in this condition.

The symmetrical mode is convenient for making narrow-band measurements since the frequency excursion is calibrated to within ±3% of the SYMMETRICAL SWEEP WIDTH range selected. For narrow sweep width this is substantially more accurate than the markers. The SYMMETRICAL SWEEP WIDTH selector provides nine convenient steps from approximately 0.2% to 100% of the sweep range for the RF Unit. Rotating the selector fully clockwise activates the concentric control which is used to vary the sweep width continuously over the full frequency range.

The symmetrical mode may also be used as an expansion of the F1-F2 mode, when the M1 marker is set to the centre of that portion of the F1-F2 display to be expanded.

The centre frequency may also be remotely programmed via the terminal strip ((1) , Figure 3-2) located on the rear panel. When jumpers linking terminals 8 to 9 and 10 to 11 are removed, remote voltage from 0 to −10 volts (applied to terminal 9 with respect to terminal 7) will linearly control the centre frequency over the full range. A potentiometer (1K recommended) or a resistor divider placed at terminals 7, 9 and 11 will also determine the centre frequency over its full range.

If several centre frequencies are required, an external switch or pushbutton control can be used to select from a number of remote programming voltages, potentiometers or resistor divider networks.

3.7.4 CW M1 Mode

When the SWEEP FUNCTION selector is set to the CW M1 position the automatic sweep mode is disabled and the output frequency is determined by the setting of the M1 control. The SWEEP ON indicator does not function in this mode.

With the SWEEP FUNCTION selector set to F1-F2, the M1 marker may be preset to a frequency of interest. When the SWEEP FUNCTION selector is placed in the CW M1 position the sweep will automatically stop at the frequency identified by the position of the M1 marker.

Remote frequency programming may be accomplished via the rear terminal strip as described in paragraph 3.15.

3.7.5 EXT/M1 Mode

When the SWEEP FUNCTION selector is set to the EXT/M1 position the automatic sweep is disabled and the output frequency is determined by an external voltage applied to the EXT SWEEP INPUT connector (located on the rear panel) and the setting of the M1 control. An analog voltage from 0 to +10 volts will control the frequency over the entire range of the RF Unit. The SWEEP ON indicator does not function in this mode.

One calibrated marker, M2, is controlled by the M2 control and is continuously adjustable over the entire range.

3.8 SWEEP RESPONSE TIME CONTROL

With the SWEEP RESPONSE switch (located on the rear panel) set to AUTO, the response (bandwidth) of the tuning supply is automatically adjusted according to the rate of change of the input

tuning voltage – whether internally or externally generated. In this manner a minimum noise bandwidth is maintained to ensure the lowest possible residual FM regardless of sweep rate. Setting the SWEEP RESPONSE to FAST forces the bandwidth to remain at its widest width at all times.

3.9 RF LEVEL

The continuously variable RF LEVEL control (front panel) is used to vary the amplitude of the RF output. Maximum RF output level is obtained by rotating the RF LEVEL fully clockwise. The LEVELLER MODE OFF pushbutton should be depressed unless levelled power is required.

3.10 RF POWER LEVELLING

3.10.1 General Considerations

The Type 6700A with any RF Unit installed is capable of maintaining a constant amplitude RF output across the frequency range. This is accomplished by comparing the dc level from an RF amplitude sampling device with the amplitude command of the RF LEVEL control. The difference (or error) is amplified and applied to a current-controlled attenuator which reduces the amplitude of the RF output to the desired level.

The RF LEVEL control sets the maximum amplitude of RF power across the frequency range. Consequently, the RF output will be levelled in those portions of the frequency band where there is sufficient RF power but will remain unlevelled in any portion where the amplitude of the RF power falls below the level demanded by the RF LEVEL control. The UNLEVELLED indicator will only be illuminated during those portions of the sweep that are not levelled.

The RF LEVEL control may be adjusted to obtain a levelled output across the entire frequency range or, if required, may be set to obtain a levelled output only over that portion of the range where the amplitude of the RF power is higher. Since minimum power output usually occurs at one end of the frequency range, the RF LEVEL control should be adjusted for levelled operation at that end of the range to obtain levelled operation across the entire frequency range.

3.10.2 Internal Levelling

No external equipment is required to provide levelled RF power when using an RF Unit featuring internal levelling circuitry. These units have an internal directional detector consisting of a flat broadband directional coupler with a crystal detector. To activate the internal levelling function, simply depress the front panel LEVELLER MODE INT pushbutton and adjust the RF LEVEL control as discussed in paragraph 3.10.1.

3.10.3 External Crystal Levelling

The output from any RF Unit may be levelled (except for those units with the –2 option) by using a remote RF amplitude sampler. This is especially desirable at the higher microwave frequencies to assure flat power at the input to the device under test. External levelling is also used to remove any power variations which may otherwise be introduced by a device inserted in the RF path such as a filter, an amplifier or a long transmission line.

For sweeping at high speeds to obtain a flicker-free oscilloscope display, depress the LEVELLER MODE EXT pushbutton. In this mode the levelling system may be used with a directional coupler (typically 10 dB) and a flat broadband crystal detector. A directional detector consisting of a coupler/crystal

detector combination in a single package may also be used.

For optimal results over a frequency range of less than 2:1, a low pass filter with cutoff frequency at the high end of the desired band may be inserted before the directional coupler. The influence which any small harmonic content of the RF signal might have on levelling is thus prevented.

3.10.4 Power Meter Levelling

The ultimate in levelling accuracy and flatness across a broad band is obtained by substituting a thermistor RF power meter for the crystal detector as discussed in paragraph 3.10.3. The long response time, however, of power meter thermistor mounts restricts Sweep Time selection to the two slower ranges, 1 SEC and 10 SEC, of the SWEEP TIME (SEC) control. These two ranges are also suitable for use in conjunction with an X-Y recorder or with oscilloscopes other than the long persistence display types.

The power meter should have a minimum output of 1 volt or 1 milliampere. Either polarity may be used. Typically, a 10 dB directional coupler and a low pass filter are used in the same manner as described in paragraph 3.10.3. A levelled output power indication is calculated by adding the directional coupler's coupling factor in dB to the power meter indication. The output power indication is influenced by both the front panel RF LEVEL control setting, and on the range selected for the power meter. It might be necessary to readjust the GAIN control when changing settings of the power meter range switch.

When square wave modulation is used the levelling action of the power meter maintains constant (average) power. Since the duty factor of the internal square wave is 50%, the peak RF power will be twice the value indicated by the average reading on the power meter.

To minimize transients at the start of sweep, it is recommended that the RF DURING RETRACE switch (located on the rear panel) be placed to ON. Refer to paragraph 3.12 for more details.

3.11 FREQUENCY MARKERS

Two independent calibrated frequency markers are generated for each sweep mode except for the EXT/M1 mode. These markers are available as negative video signals at the VIDEO MARKER OUTPUT connector located on the rear panel. The marker waveforms may be displayed on the second channel of a dual trace oscilloscope or X-Y recorder, or used as an oscilloscope intensity variation signal, or used to activate systems such as a network analyzer.

Placing the RF MARKER switch (rear panel) to ON causes the RF Markers to be displayed as a sharp dip in RF power. Marker amplitude is varied by the continuously adjustable MARKER AMPLITUDE control located on the front panel.

3.12 BLANKING DURING RETRACE

When the RF DURING RETRACE switch (rear panel) is set to OFF, the RF power is turned off during retrace of the internally generated sweep. This feature provides a zero power reference base line for the RF display. Dwell time is also provided at both start and finish of sweep. Setting the switch to ON provides RF power during both trace and retrace. This is useful for power meter levelling setups and for chart recorder operation since it eliminates large changes in amplitude at the beginning and end of sweep.

A negative video pulse coincident with the retrace is present at the BLANKING OUTPUT connector. In addition, a contact closure during forward trace is available at the PEN LIFT terminal for use with recorders having the capability to discontinue writing during retrace. The PEN LIFT contacts automatically remain open in MANual sweep mode, the .1 and .01 SEC SWEEP TIME settings and when primary power is off.

3.13 AMPLITUDE MODULATION

3.13.1 Internal Square Wave

The internal 1KHz square wave generator, especially useful with a tuned detection amplifier, may be activated in any mode by setting the 1 KHZ ⊓⊔ switch to ON. The associated front panel screwdriver adjustment provides the means to change the frequency over a range from 950 to 1050 Hz. The oscillator, which provides 100% modulation, produces a peak RF power identical with square-wave-off power in Levelling OFF or XTAL. In the power meter levelling mode, the average power remains the same and may require resetting the RF LEVEL control to maintain peak power with the RF Unit's maximum output capability.

3.13.2 External AM

An external amplitude modulating signal may be applied to the AM INPUT connector located on the rear panel of the RF Unit. External modulation signals are mixed directly with the output of the RF LEVEL control circuit. Amplitude distortion of the modulation is minimal when XTAL levelling is used. Power will remain linear with an external amplitude modulating signal when power meter levelling is employed, but frequency response is somewhat limited. Adjusting the RF LEVEL control will centre the dynamic range of the amplitude modulation.

3.13.3 External Pulse

Pulse modulation input signals are applied to the AM INPUT connector on the rear panel of the RF Unit. When this input is being used, make sure the RF LEVEL control is rotated fully anti-clockwise to ensure that the RF amplitude remains low except during a pulse. The LEVELLER MODE OFF pushbutton must be depressed.

3.14 DISPLAYING SWEPT FREQUENCY MEASUREMENTS

For rapid evaluation or adjustment of a device under test, the oscilloscope is generally the most convenient display method. A simple setup using a broadband crystal detector, a pad and an oscilloscope is illustrated in Figure 3-3.

The RF output, after passing through the pad and the device under test, is converted to a video signal by the crystal detector and applied to the vertical input of the oscilloscope. The pad is used to provide a proper source match and to reduce the power level so that the detector operates within its square law region. A sweep signal from either the front panel SWEEP OUTPUT connector or the rear panel DISPLAY SWEEP OUTPUT connector is used to provide the horizontal drive for the oscilloscope. The DISPLAY SWEEP AMPLITUDE control, located on the rear panel of the Mainframe, or the horizontal gain control on the oscilloscope may be used to adjust the display width.

Measurements will be enhanced by levelling, as discussed in paragraph 3.10.

An X-Y recorder may also be used to obtain a permanent record of the evaluation or adjustment of the device under test. As shown in Figure 3-4, the test setup using the recorder is very similar to the one for the oscilloscope. The SWEEP TIME (SEC) control must be set to either 1 or 10 and the vernier adjusted to meet the response time of the recorder. If the recorder has a pen lift or equivalent writing enable-disable feature it should be connected to the rear panel PEN LIFT terminal on the Mainframe to prevent chart marking during retrace.

The recorder X and Y scale factors and zero suppression may be conveniently adjusted by setting the SWEEP TIME (SEC) selector to MAN and rotating the associated concentric VARIABLE control knob.

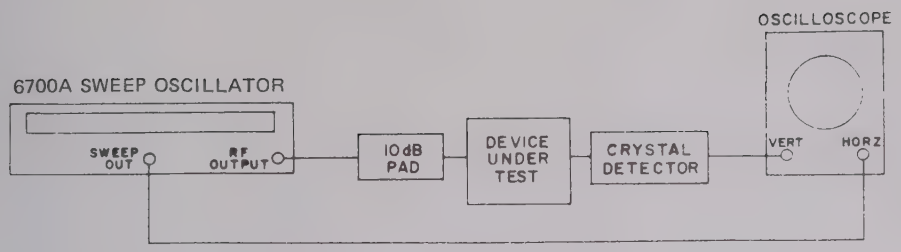


Figure 3-3. Swept Frequency Measurement Test Set-Up Using an Oscilloscope Display.

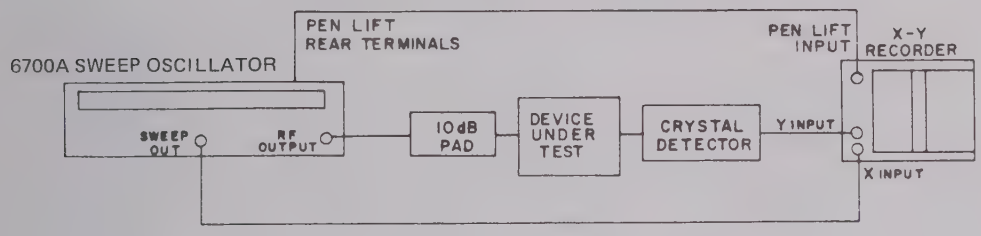


Figure 3-4. Swept Frequency Measurement Test Set-Up Using an X-Y Recorder Display

3.15 REMOTE PROGRAMMING OF FREQUENCY AND AMPLITUDE

The Type 6700A Sweep oscillator may be remotely controlled by using an external negative or positive going analog voltage, a resistance source, or BCD logic level to determine the output frequency and the power level. Wideband remote frequency control e.g. phase locks, must be applied via the RF Unit rear panel FM INPUT connector. Frequency deviation is superimposed on the output frequency determined by the other inputs and controls.

3.15.1 Frequency — Analog Voltage Control

Remote control of the output frequency through the use of a 0 to +10 volt signal, that may be either dc or a special waveform, is accomplished by setting the SWEEP FUNCTION selector to EXT/M1 and applying the input control voltage to the rear panel EXT SWEEP INPUT connector. The F1 and F2 controls are inoperative, but the M2 control still sets the M2 marker. In this mode the M1 control determines the 0 volt start frequency.

To effect frequency control by using a 0 to −10 volt signal requires setting the SWEEP FUNCTION selector to CW M1, or if the remote signal is being modulated then set the SWEEP FUNCTION selector to SYM M1. Remove the jumper from terminals 8 and 9 of TB-1 (located on the rear panel) and connect the input signal to terminal 9 and the signal return to terminal 7. (If a shielded cable is used connect the shield to terminal 6.) The internal electronic sweep provides a calibrated symmetrical sweep, having a width set by the SYMMETRICAL SWEEP WIDTH control located on the RF Unit, that sweeps about the centre frequency determined by the input control voltage. The M1 control is ineffective; F1 and F2 controls still provide markers. If desired, the internal electronic sweep may be disabled by setting the SWEEP TIME (SEC) selector to MAN, or by setting the TRIGGER selector to EXT and positioning the SYMMETRICAL SWEEP WIDTH control fully anticlockwise.

Rear panel connector J1 may also be used as an input for a remote control voltage. This input may be used alone or in conjunction with any of the remote programming techniques being discussed.

A voltage applied to pins A and B (signal to B and return to A) of connector J1 operationally adds to the output frequency in every mode. This feature may be especially convenient when used as a vernier control about a preset frequency. A 10 volt change covers the entire frequency band of the RF Unit with an increase in frequency corresponding to a more positive voltage level.

3.15.2 Frequency — Resistance Control

Controlling the output frequency by means of external resistors is accomplished by connecting a resistance divider or a potentiometer (1K recommended) to terminal strip TB1 located on the rear panel. Connect the external resistance to terminals 7, 9 and 11 as illustrated just below the terminal strip. Set the SWEEP FUNCTION selector to CW M1, or if the remote signal is being modulated, set the SWEEP FUNCTION selector to SYM M1. The internal sweep provides a calibrated symmetrical sweep, having a width set by the SYMMETRICAL SWEEP WIDTH CONTROL located on the RF Unit, that sweep about the centre frequency determined by the input control signal. The M1 control is ineffective; F1 and F2 controls still provide normal markers. The automatic sweep may be disabled by setting the SWEEP TIME (SEC) to MAN, or by setting the TRIGGER selector to EXT. Since the remote resistance divider replaces the function of the M1 control, this type of setup permits remote marker control in the F1-F2 mode, and remote sweep start control in the M1-M2 mode.

3.15.3 Frequency — Digital Control

To implement remote control via externally generated digital signals requires that the —01 option, which is a plug-in PC card, be installed in the mainframe. The REMOTE PROGRAMMING INPUT connector, a 36-pin rear panel mainframe connector, provides twelve digital input lines for a remotely generated 3-digit BCD word used to determine the frequency. One input line, Remote Enable, is provided to control the mode of operation — either local or remote. A second input line is provided for strobing the 12-line 3-digit BCD input lines. If the strobe line remains open (a logic "1" condition) any 12-bit word present at the input lines will determine the output frequency. Placing a ground (a logic "O" condition) on the strobe line causes the unit to hold the last 12-bit word, regardless of the state of the 12 input lines, until the strobe line changes to a logic "1" condition. This feature allows a given 12-bit word, corresponding to a specific frequency, to be held in memory as long as the strobe input line remains at a logic O, even though the digital word on the 12 lines may be changing.

One additional line is provided for remote control of the RF ON/OFF switch on the front panel of the RF Unit. Grounding this line shuts off the RF source power. Leaving the line open or at +5 volts turns on the RF source power. This line is standard equipment on the Type 6700A and is not part of the —01 option for the mainframe.

3.15.4 RF Amplitude — Voltage and Resistance Control

The amplitude of the RF output signal is easily controlled by simply applying a command input voltage to the AM INPUT connector located on the rear panel. An analog voltage of either 0 to +5 volts or 0 to —5 volts, will cause the amplitude to change across its entire range with a negative going voltage corresponding to a decrease in the output power level.

3.16 FREQUENCY MODULATION

3.16.1 External FM

An external frequency modulating signal may be applied to the FM INPUT connector located on the rear panel of the RF Unit. Positive going voltages cause the frequency to increase with respect to the centre frequency and negative going voltages cause the frequency to decrease with respect to the centre frequency. For this mode of operation, the SWEEP FUNCTION selector switch on the front panel of the Mainframe should be set to the SYM M1 position, the SWEEP TIME switch set to MAN, and the SWEEP RESPONSE TIME slide switch on the rear panel of the Mainframe should be set to FAST. Set the SYMMETRICAL SWEEP WIDTH switch on the PLUG-IN Unit to the fully anti-clockwise position. The M1 control will be used to set the centre frequency. The input impedance at this port is approximately 5 K ohms to ground. The input/output relationship for YIG tuned RF Units is as follows:

6738A	20MHz/Volt
6742A	20MHz/Volt
6754A	40MHz/Volt
6766A	44MHz/Volt
6774A	56MHz/Volt

3.16.2 Phase Locking

Phase locking is possible by applying the error signal from the "LOCK BOX" to the FM INPUT connector.

For this mode of operation, the SWEEP FUNCTION selector switch on the front panel of the Mainframe should be set to the SYM M1 position, the SWEEP TIME switch set to MAN, and the SWEEP RESPONSE TIME slide switch on the rear panel of the Mainframe should be set to FAST. Set the SYMMETRICAL SWEEP WIDTH switch on the PLUG-IN Unit to the fully anticlockwise position. The M1 control will be used to set the centre frequency.

SECTION 4
PRINCIPLES OF OPERATION

4.1 INTRODUCTION

This section contains a brief block level description of the Type 6700A Mainframe and a detailed description of individual circuits. These descriptions are supported by Figure 4-1, a block diagram of both the Mainframe and a generalized RF Unit, and Figures 4-2 to 4-12, simplified circuit diagrams covering selected areas of discussion. Complete circuit diagrams are provided in Section 6.

4.2 BLOCK DIAGRAM DESCRIPTION

The Type 6700A Mainframe, as shown in Figure 4-1, contains sweep generating circuitry consisting of a sweep trigger, sawtooth oscillator, sweep limiter and sweep amplifiers; a frequency marker generator; a square wave generator (for internal amplitude modulation); and a power supply section for generating the various voltages required for both the mainframe and the RF Unit.

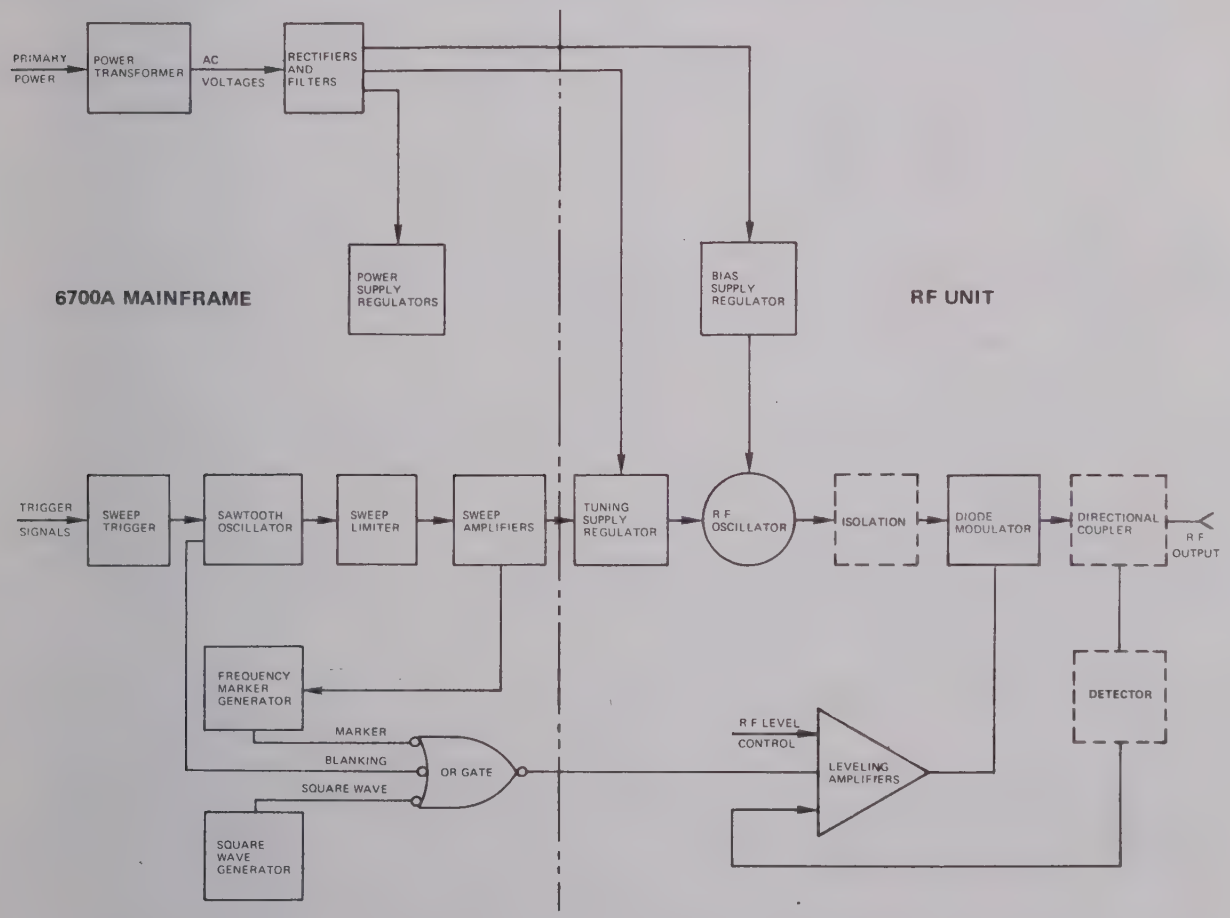


Figure 4-1. Block Diagram of Type 6700A Mainframe and RF Unit

The function of the sweep trigger circuit is to reshape and standardize the negative going input trigger signal. The resultant positive output pulse is used to trigger the sawtooth generator which in turn develops a negative sawtooth voltage. This 0 to −12 volt waveform, after being inverted and limited to +10 volts by the sweep limiter, is applied to the sweep amplifiers which modify the positive going waveform in accordance with the front panel SWEEP FUNCTION control setting. The modified output from the sweep amplifiers is used to drive the tuning supply regulator which in turn controls the RF oscillator. As a result, the oscillator sweeps only that portion of its frequency range which corresponds to the sweep amplifiers' output waveform.

The amplitude of the RF output signal is determined by the electronically controlled attenuation of the diode modulator located in the RF Unit. The levelling amplifiers section drives the modulator with a control current determined by the setting of the RF LEVEL control. When levelling is in operation, a portion of the RF output is sampled by the directional coupler, detected, and fed back to the levelling amplifiers as a negative feedback control signal. As the output frequency is varied, the levelling control loop maintains the detector output at a constant level. The amplitude variation of the RF output, therefore, depends only on the characteristics of the directional coupler/detector combination.

The frequency marker generator circuit compares a sweep voltage with the marker control voltage to develop marker signals at the corresponding RF frequencies. The square wave generator, the retrace blanking signal and the markers, when individually activated by front or rear panel controls, are gated through the OR gate and applied to the levelling amplifiers as modulation.

4.3 CIRCUIT DESCRIPTIONS (Mainframe)

The following discussion covers circuits and controls located on assemblies:

A1 — Sweep and Marker Generator
A2 — Power Supply
A4 — Motherboard
A5 — Trimmer Board

The discussion covering Assemblies A4 and A5 is not presented as a separate topic but is included as part of the A1 Assembly discussion so that the proper relationship between assemblies may be easily understood.

4.3.1 Sawtooth Oscillator (Sweep and Marker Generator)

Sweep generation is accomplished by circuitry consisting of a sweep trigger, a sawtooth oscillator, a sweep limiter and sweep amplifiers. Figure 4-2 is a simplified circuit diagram of the sawtooth oscillator whose waveform is processed to develop all internally generated sweep waveforms.

Setting the SWEEP TIME (SEC) switch (A4A2S1) to one of the four sweep time positions (.01, .1, 1 or 10) inserts a capacitor between the output and the input of IC1A which, with its input resistors, forms an intergrator circuit. A variable reference voltage, applied to one input of IC1A from resistor A4A2R1 via A4R18, develops a 0 to −12 volt linear sawtooth output.

Integrator action is transferred from a forward trace to a retrace when the Binary section (bistable multivibrator) is in the reset condition. During forward trace Q3 is conducting and Q4 is cutoff. However, when the output from IC1A reaches −12 volts, a comparator consisting of R24, R27 and CR7 drives the base of Q4 negative causing it to conduct. This action resets the binary circuitry and turns Q3 off. The resulting negative potential on the collector of Q3 sets up a large recharging current which flows through R22 and CR8 to the integrator, which causes it to retrace by reversing the direction of current flow. Diode CR11 terminates the sawtooth retrace at approximately zero volts.

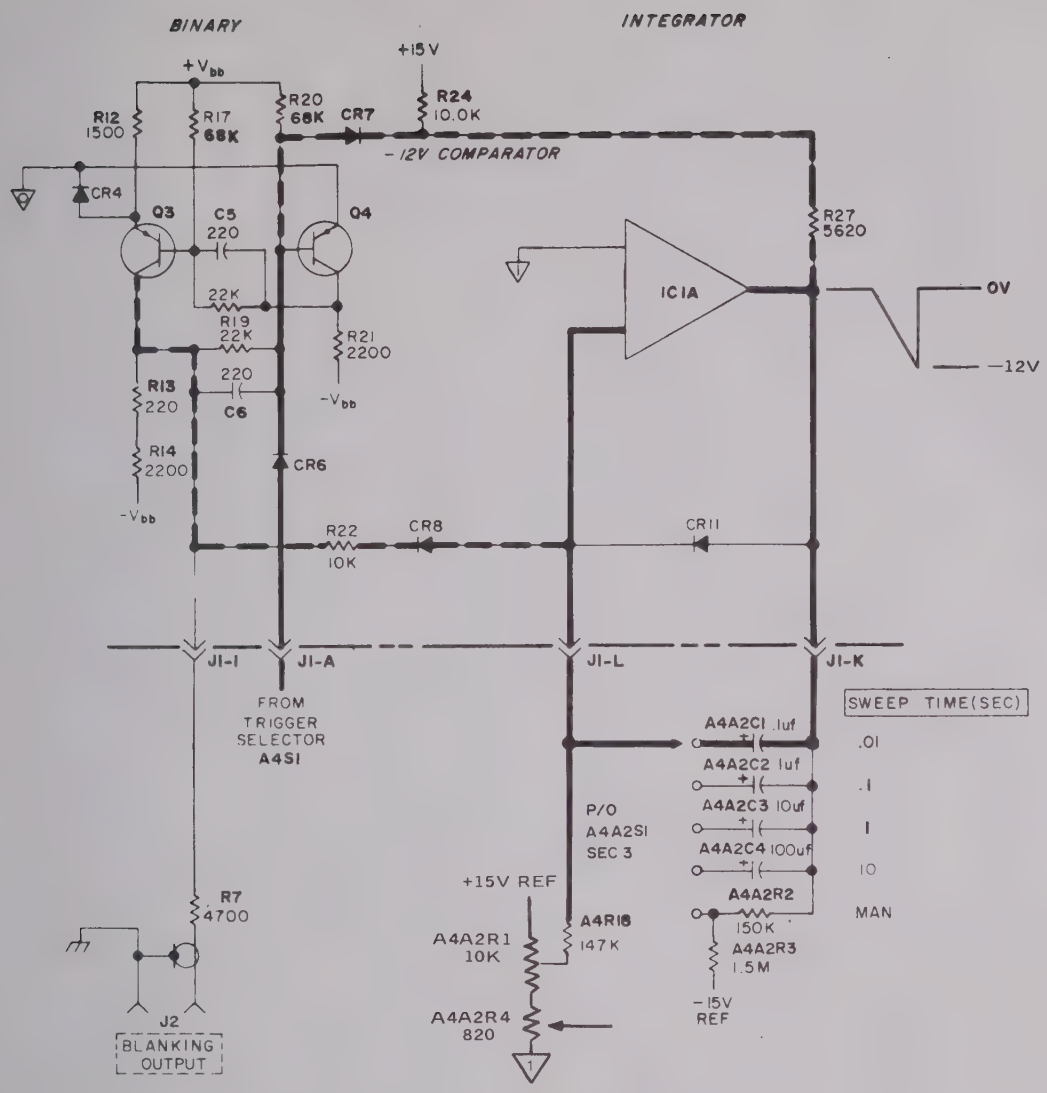


Figure 4-2. Sawtooth Oscillator, Simplified Circuit Diagram

External or internal trigger signals selected by switch A4S1 are applied through CR6 to the base of Q4. This sets the Q3/Q4 multibrator and initiates the next forward trace and the process is repeated.

Generation of the blanking waveform is accomplished by using the collector output from Q3. The collector potential is zero during trace and goes negative during retrace. Resistor R7 is used to provide isolation for the BLANKING OUTPUT signal at J2.

Setting switch A4A2S1 to MAN removes the capacitor from the feedback circuit of IC1A and replaces it with resistor A4A2R2. This allows the output level from IC1A to be manually varied from 0 to −12 volts which causes the sweep to move at the same rate.

NOTE

The following paragraph covers details not included on the simplified circuit diagram of the sawtooth oscillator. For a better understanding it is recommended that Figure 6-4 be used as reference.

Transistor A4Q1, a lamp driver, is turned on every time Q3 conducts. When A4Q1 conducts, SWEEP ON indicator DS2 is lit indicating that an internally generated sweep is in progress. Normally open relay A4K1 (Pen Lift) is energized when A4A2S1 is set to either the 1 or 10 sec. position. In these positions, transistor Q5 conducts through Section 1 of A4A2S1 to energize A4K1. With A4A2S1 set to MAN, the tap on Q3's collector load lies at approximately zero volts, which holds the Binary section in its forward trace state without illuminating the SWEEP ON indicator. In addition to the wiper of A4A2S1, Section 3, which selects the capacitor or resistor for the feedback circuit, another wiper provides a discharge path for each integrator capacitor when changing between sweep range settings. It should be noted the RF DURING RETRACE switch (S4), which applies blanking signals to the OR gate depicted in Figure 4-1, is set to OFF.

4.3.2 Sweep Limiter (Sweep and Marker Generator)

Dwell time is provided at the start and finish of the internally generated sweep by limiting the sawtooth so that its sharp peak is flattened as indicated in Figure 4-3, a simplified circuit of the Sweep Limiter section.

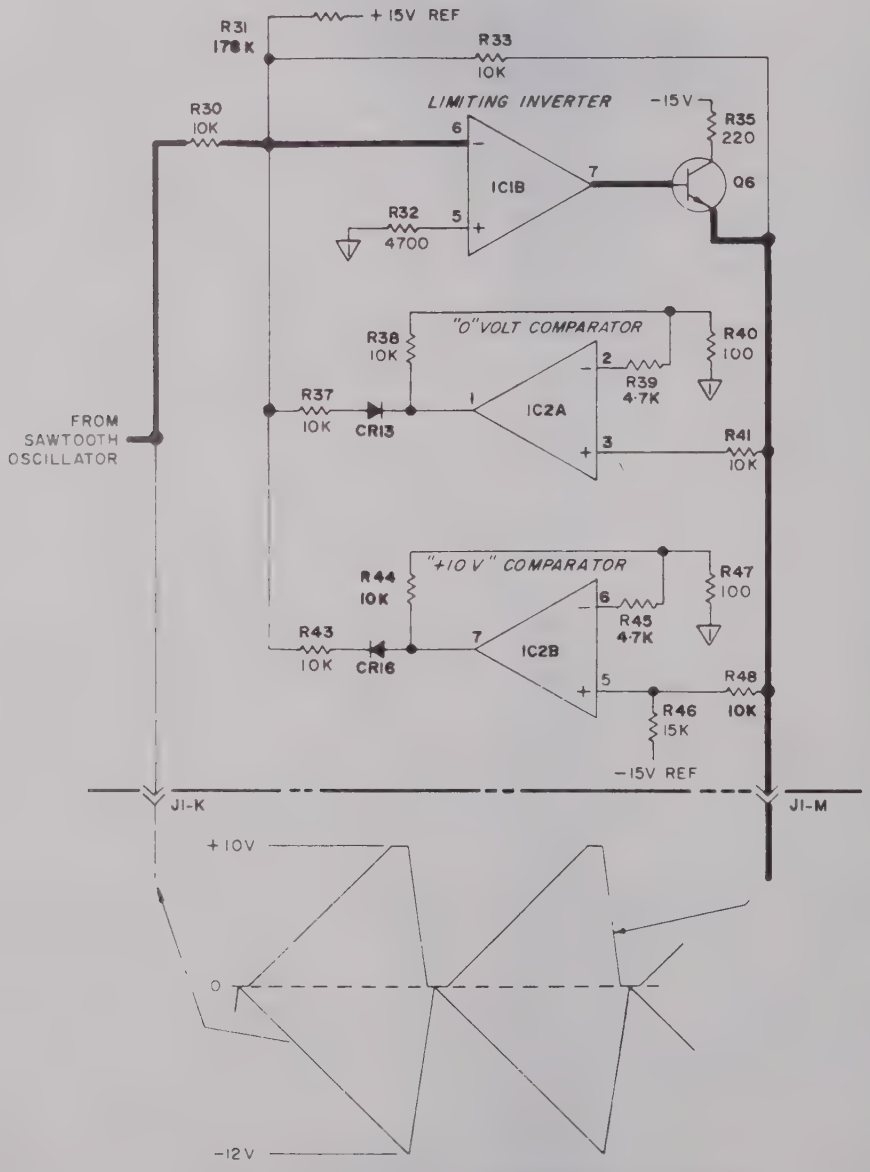


Figure 4-3. Sweep Limiter, Simplified Circuit Diagram

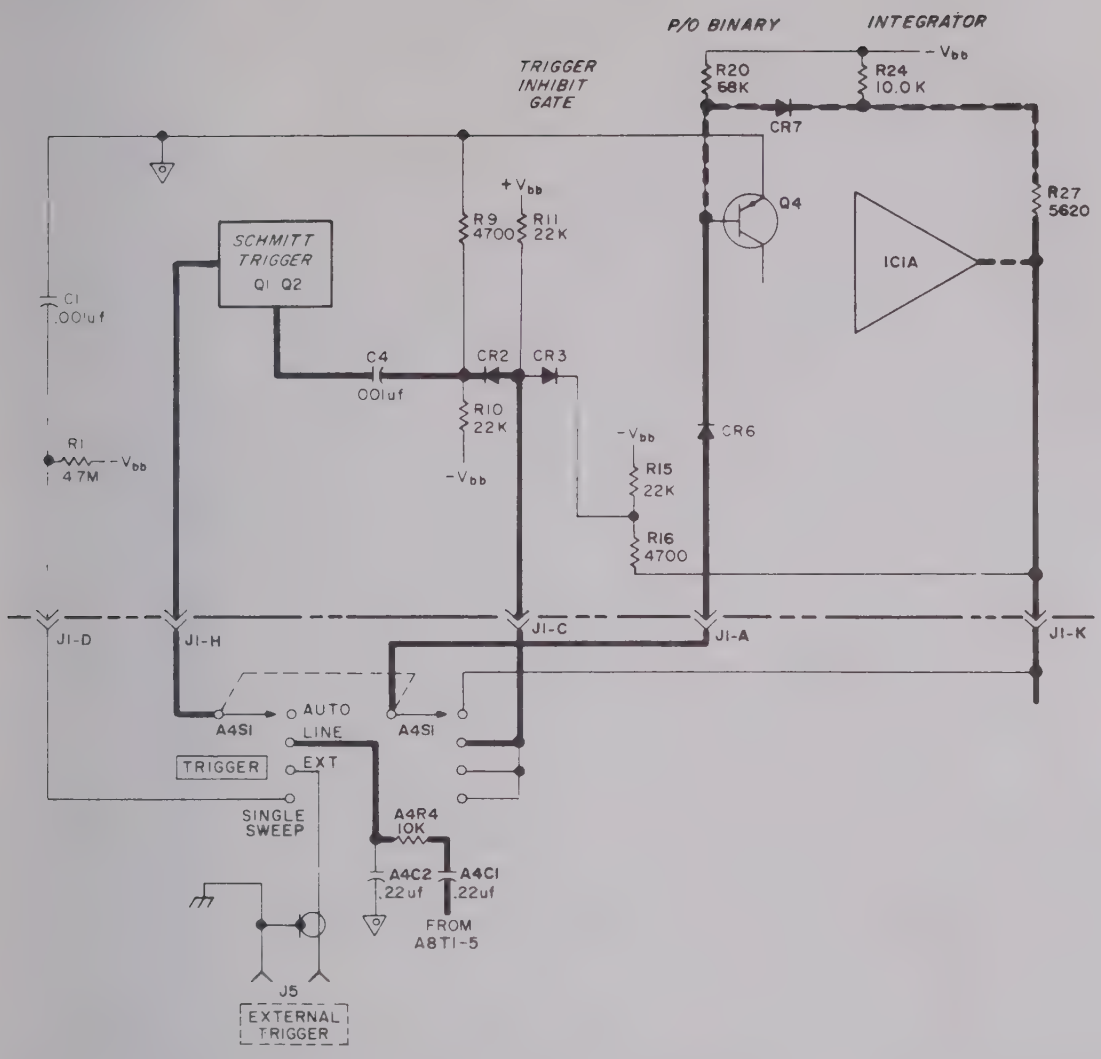


Figure 4-4. Sweep Trigger, Simplified Circuit Diagram

The negative going sawtooth is applied to pin 6 of IC1B, an operational amplifier with a gain of −1. A small dc shift current is applied via R31 to the input of IC1B so that, in the absence of the clamping action of IC2, the output sawtooth of Q6 would go from −1 to +11 volts. The output voltage at the emitter of Q6 will, in fact, never go below zero volts because of the "O" volt comparator, IC2A. When the input at pin 3 begins to go negative by only a few millitvolts, the output on pin 1 immediately goes negative by several volts. This negative voltage is applied through CR13 and R37 to the input if IC1B to negate any further decrease in the input signal. Thus, the most negative output from the emitter of Q6 will never be lower than zero volts.

Similarly, the +10V comparator, IC2B, prevents the output from Q6 exceeding +10 volts. When the input at pin 5 of IC2B begins to exceed +10 volts by just a few millivolts, the output on pin 7, which is applied via CR16 and R43 to the input of IC1B, goes positive by several volts. This correction signal prevents the output from ever exceeding +10 volts.

For comparison, the sawtooth input waveform and the sweep limiter output waveform are shown together at the bottom of Figure 4-3. The SWEEP OUT signal is taken from the sweep limiter output and used to provide a display sweep synchronous with the internally generated electronic sweep or manual sweep (F1-F2, M1-M-2 and SYM M1 modes) of the output frequency.

4.3.3 Sweep Trigger (Sweep and Marker Generator)

As mentioned in paragraph 4.3.1, the Binary section of the Sawtooth generator is reset on completion of a forward trace, and remains reset until set again by a sweep initiating trigger signal. The choice of trigger signal is determined by the front panel TRIGGER selector control as illustrated in Figure 4-4.

When switch A4S1 is set to EXT, a negative going input signal from the rear panel EXTERNAL TRIGGER connector is routed through A4S1 and applied to the Schmitt trigger circuit for standardization of rise-time and amplitude. The positive going output, after being differentiated by C4 and R9, is applied to a Trigger Inhibit Gate consisting of diodes CR2 and CR3. This gate inhibits the passage of a positive trigger until after Integrator IC1A has completed its retrace. This allows the junction of CR2 and CR3 to follow the positive trigger pulse, which is routed through the right hand portion of A4S1 to the base of Q4 which sets the Binary section to the forward state.

When the TRIGGER selector is set to LINE, a sample of the 50/60 Hz line frequency from T1 is coupled through A4C1 and A4S1 and applied to the Schmitt trigger circuit for standardization. After completion of the retrace, the next cycle of the line frequency will initiate a new sweep.

Automatic recurring sweep results when the TRIGGER selector is set to AUTO because the integrator output is then used directly as the input signal which sets the Binary section to the forward state. Upon retracing from negative to zero volts, the integrator output becomes positive enough to cut off Q4 via CR7.

4.3.4 Sweep Amplifiers (Sweep and Marker Generator)

The internally generated sweep tuning waveform applied to the tuning supply regulator section of the RF Unit is modified by the sweep amplifiers in accordance with the SWEEP FUNCTION selector setting. Each position of the SWEEP FUNCTION selector interconnects the amplifiers and tuning control potentiometers in a distinct configuration.

4.3.4.1 F1-F2/M-1M2 Sweep Mode

The sweep waveform required at the input to the tuning supply regulator (located in RF Unit) in both the F1-F2 and M1-M2 modes has its start and finish voltages adjusted to conform with the sweep voltages that correspond to the frequency settings of either M1-M2 or the F1-F2 frequency marker indicators. Figure 4-5 illustrates how this is accomplished. Voltage divider A4R11 and A4R12 divides the input sweep waveform by two and shifts the dc level. Operational amplifier IC3A doubles the result so that the combination has a gain of +1 with a dc shift. A portion of the output voltage from IC3A, as determined by the setting of the F1 (or M1) potentiometer is applied to pin 3 of IC4A. At the same time, the input is applied to pin 6 of IC3B which inverts the waveform but does not introduce a dc shift. Again, a portion of the output from IC3B is applied through potentiometer F2 (or M2) to pin 5 of IC4B. The two outputs from voltage followers IC4A and B are combined and summed by IC5A which has a gain of −1. Thus, the starting value and the finish value of the sweep voltage are proportional to the setting of F1(M1) and F2(M2) potentiometers, respectively.

The direction of sweep is always from F1(M1) to F2(M2). For normal operation F1(M1) is generally set to a lower frequency than F2(M2). However, F1(M1) may be set higher in frequency than F2(M2) by a cross-over of their indicators. The output will then sweep from a higher to a lower frequency.

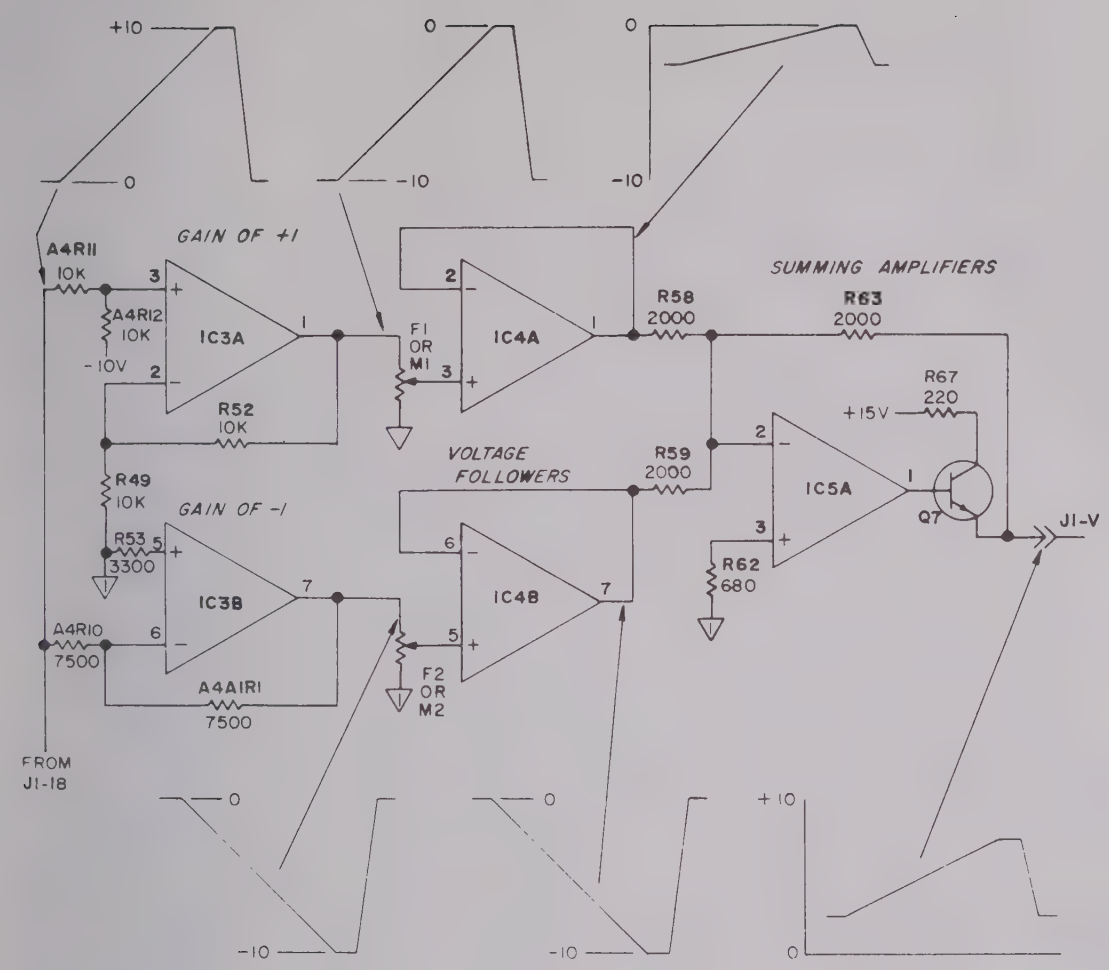


Figure 4-5. Sweep Amplifier (F1-F2/M1-M2 Modes), Simplified Circuit Diagram

4.3.4.2 Symmetrical Sweep Mode (SYM M1)

In the SYM M1 mode, the sweep amplifiers are connected as shown in Figure 4-6. The input sweep waveform is applied to pin 6 of variable gain amplifier IC3B. The amplitude of the output on pin 7 is determined by the setting of the SYMMETRICAL SWEEP WIDTH control located on the RF Unit. A dc offset current, (equivalent to a 5 volt shift in the sweep input waveform is applied via A4R13 to balance the output sawtooth of IC3B about 0 volts. After passing through voltage follower IC4B, the sweep waveform is combined with the dc level established by the M1 potentiometer and applied to summing amplifier IC5A. In this way the centre frequency is set by the position of the M1 control and the excursion is established by the SYMMETRICAL SWEEP WIDTH control.

4.3.4.3 External/M1 Sweep Mode (EXT/M1)

In the EXT/M1 sweep mode, the sweep amplifiers are connected as shown in Figure 4-7. The external input applied to rear panel EXT SWEEP INPUT connector is fed to pin 2 of IC3A whose output

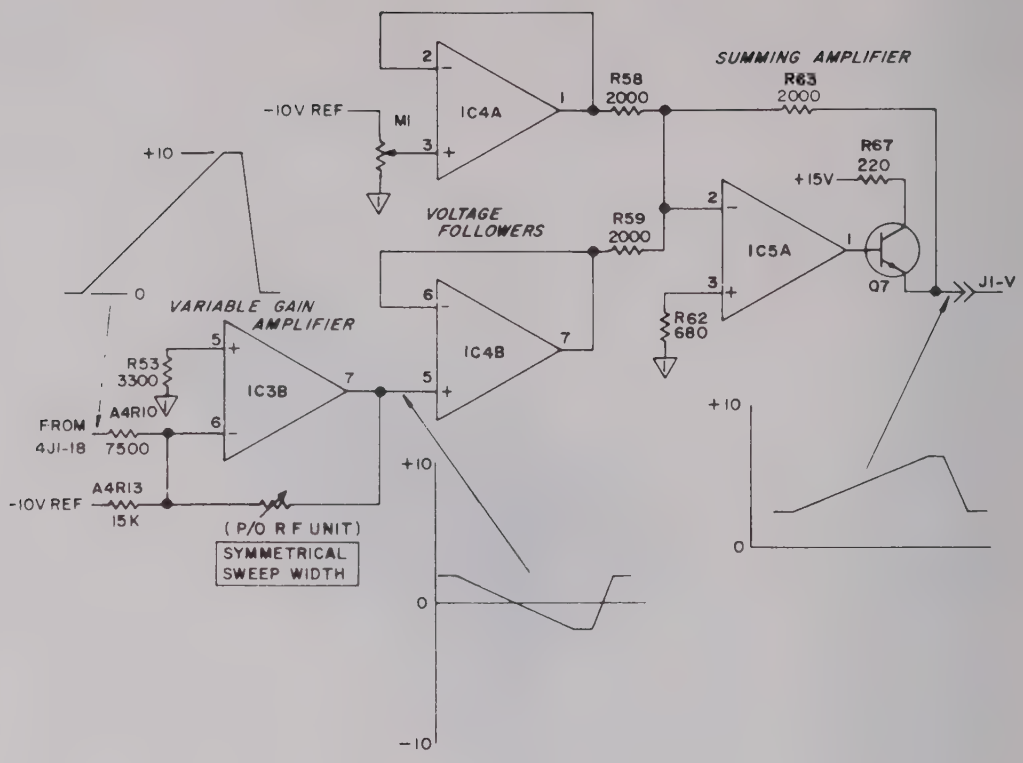


Figure 4-6. Sweep Amplifier (SYM M1 Mode) Simplified Circuit Diagram

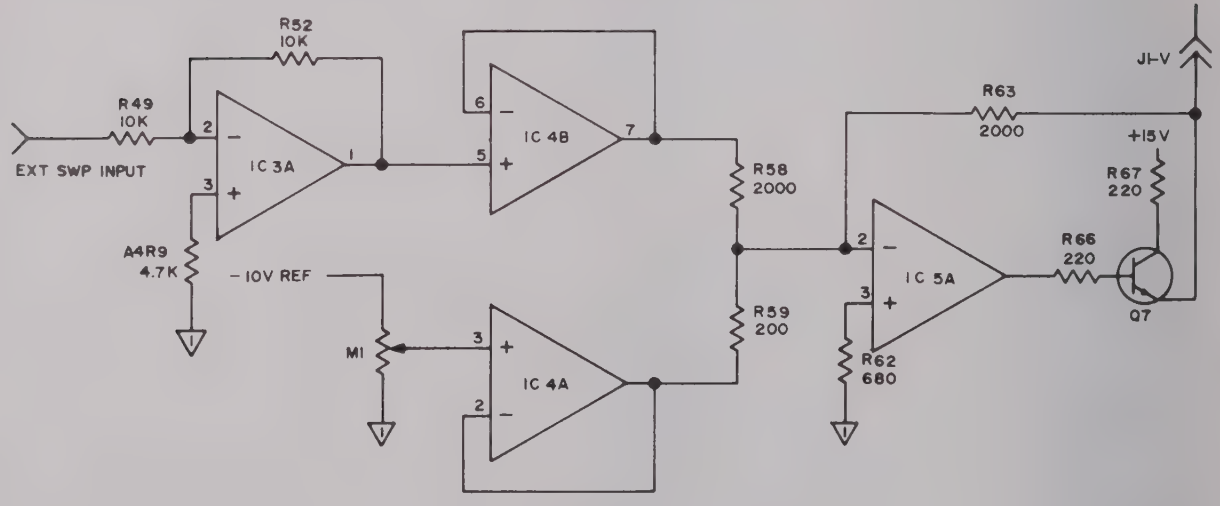


Figure 4-7. Sweep Amplifier (EXT/M1 Mode) Simplified Circuit Diagram

is used to drive voltage follower IC4B. The output from pin 7 of IC4B is combined with the dc level established by the M1 control and summed by amplifier IC5A. The tuning supply output voltage from pin 1 of summing amplifier IC5A represents the algebraic sum of the dc level from the M1 control and the external sweep input signal. The operator may vary the external sweep input voltage between 0 and +10 volts to cause a corresponding change in the output frequency. It should be noted, however, that the resulting frequency is determined by both the external input signal and the M1 control setting. The amplifier chain, which duplicates the tuning supply input, applies this combined signal to the frequency marker circuit so that the M2 marker may be generated.

4.3.4.4 CW M1 Mode

As shown by Figure 4-8, adjusting the M1 control establishes a dc level which is applied to pin 3 of voltage follower IC4A. The buffered output is fed through R58 to a unity gain amplifier consisting of IC5A and Q7 whose output is used to drive the tuning supply regulator. Thus, varying M1 will cause a corresponding change in the output frequency.

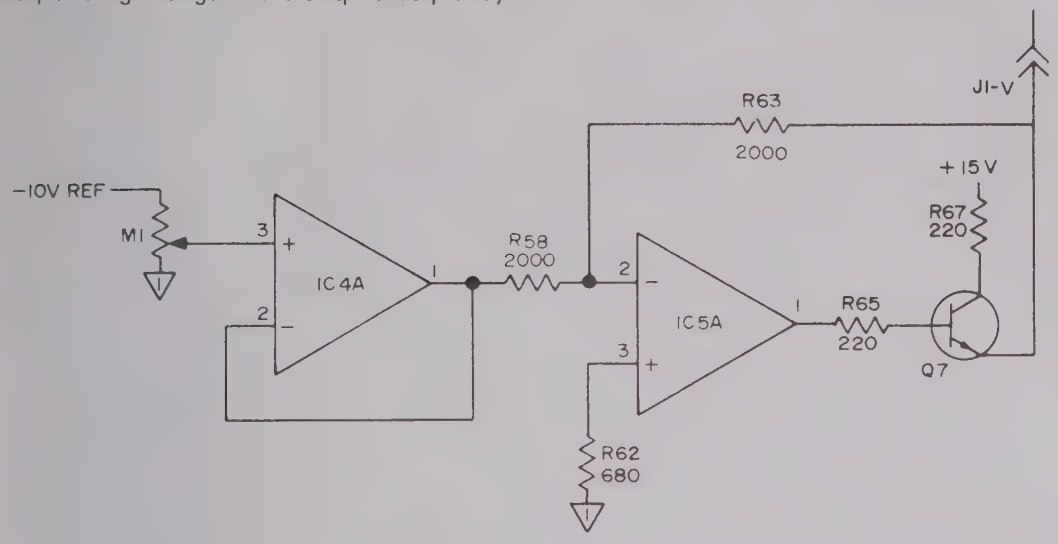


Figure 4-8. Sweep Amplifier (CW M1 Mode), Simplified Circuit Diagram

4.3.5 Proportional Output (Sweep and Marker Generator)

As shown in Figure 4-9, the proportional output signal available at the rear panel PROPORTIONAL OUTPUT connector is present in all sweep modes. With the PROPORTIONAL OUTPUT switch set to 10V/BAND the tuning voltage developed in the Mainframe is available at the connector.

The higher scale factor of 40V/OCTAVE is obtained from the feedback amplifier consisting of IC5B and Q8. The output from the sweep amplifier is applied via R68 to the inverting input (pin 6) of IC5B. The output on pin 7 is inverted again by Q7 and applied through R11 and the 40V/OCTAVE switch to PROPORTIONAL OUTPUT connector J6. Gain is determined by the values of R7 (in the RF Unit) and R69. For a one octave RF Unit the gain is +4 which means that the proportional output will be zero at the low end and +40 volts at the high end of the octave.

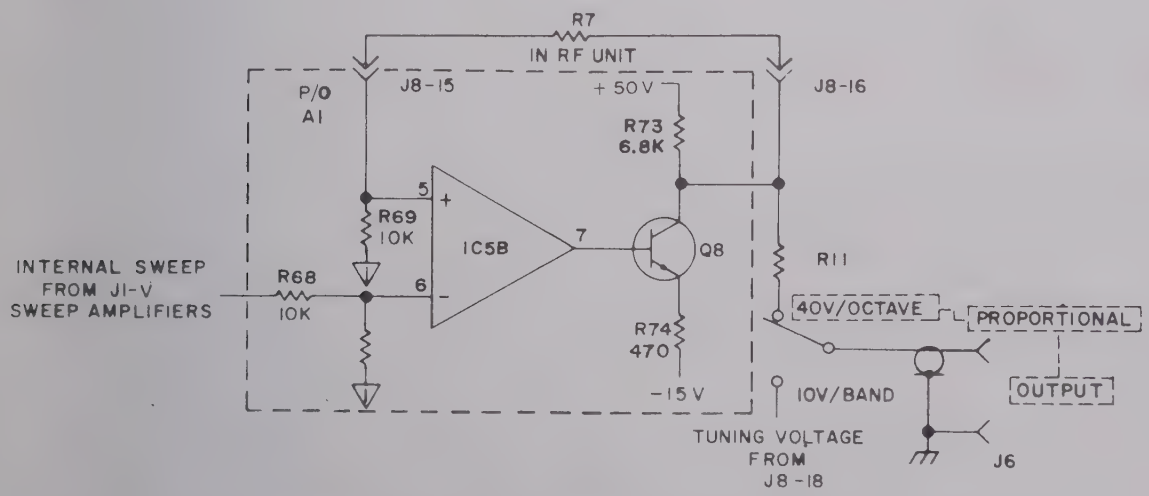


Figure 4-9. Proportional Sweep Amplifier, Simplified Circuit Diagram

4.3.6 Frequency Marker (Sweep and Marker Generator)

Each marker is generated by comparing a dc voltage with a sweeping voltage. When the sweep voltage amplitude coincides with the marker dc voltage, a marker waveform is generated. The dc voltage is obtained from a front panel marker frequency control potentiometer (M1, M2, F1 or F2) whose setting represents a voltage level corresponding to its marker position on the frequency scale.

As shown in Figure 4-10, comparison between sweep voltage and the dc voltage from the marker control potentiometer is accomplished via equal input resistors to a difference amplifier. Its output is a greatly amplified version of the zero crossing which results when the sweep input amplitude is equal to the marker dc voltage. The difference amplifier's direct output and an inverted output are compared by an AND gate which selects the more positive of its inputs, resulting in a triangular output. The apex of this triangle occurs when the value of the sweep signal equals the dc level set by the marker potentiometer. The outputs of both marker channels are combined in an OR gate, attenuated by the front panel MARKER AMPLITUDE control, and presented as both Video Marker Output signals and as amplitude dips if the RF MARKER switch is set to ON.

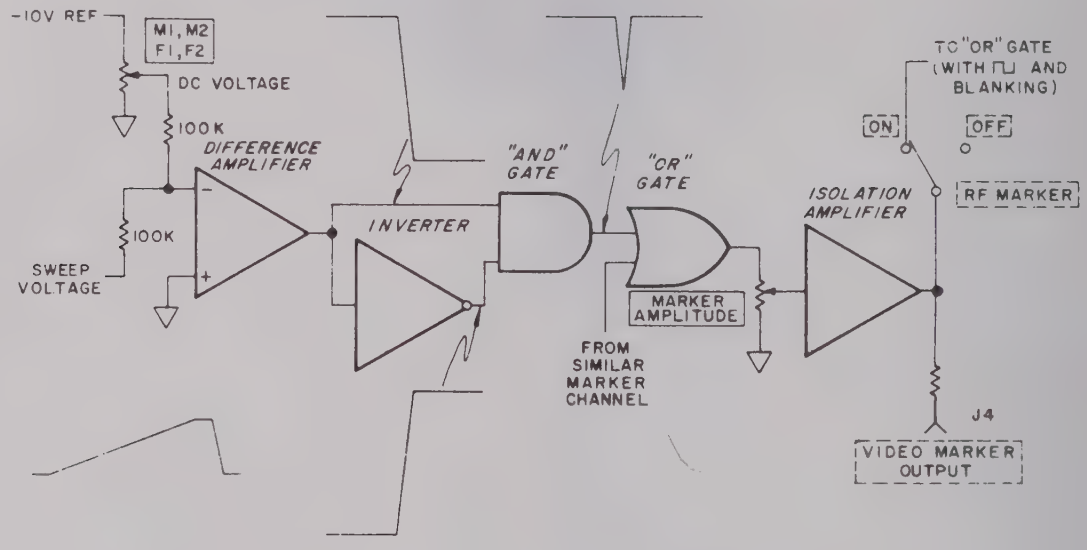
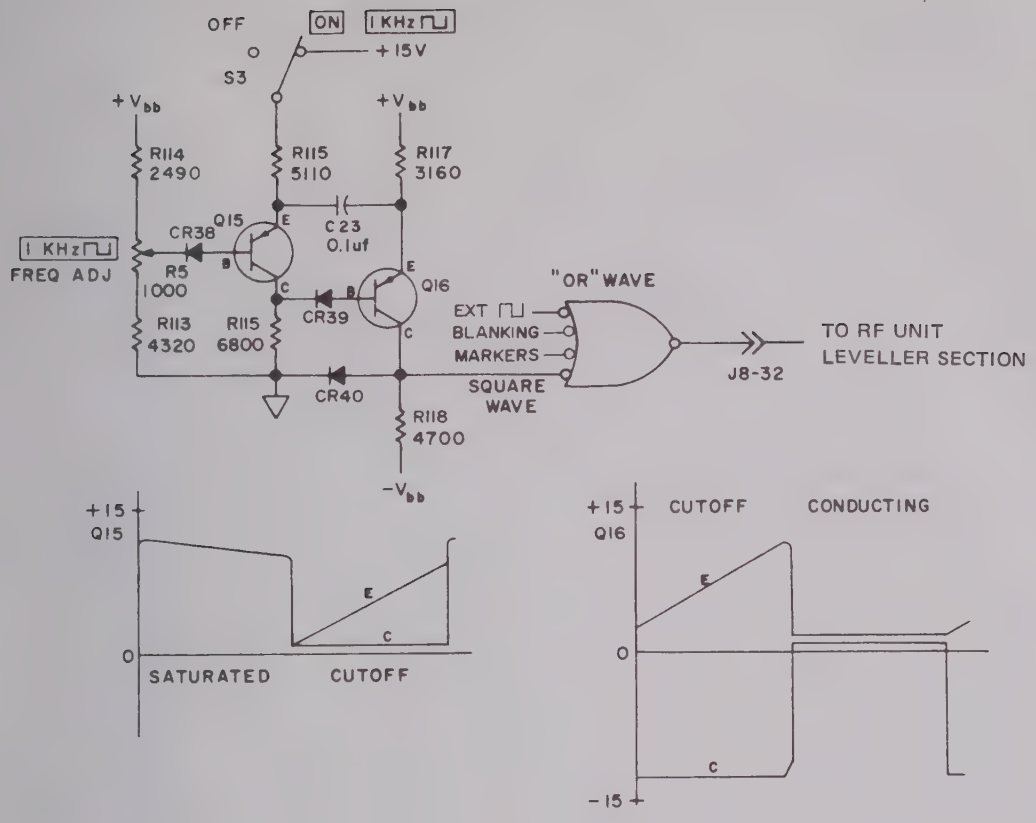


Figure 4-10. Frequency Marker Generation

4.3.7 Square Wave Generator (Sweep and Marker Generator)

Internal square wave amplitude modulation is provided by the circuit shown in Figure 4-11. Transistors Q15 and Q16 comprise an emitter-coupled free-running multibrator that is activated when the front panel 1KHz ⊓⊔ switch is set to ON. As Q15 goes into saturation, it cuts off Q16 by capacitively driving the emitter of Q16 to a low potential while, at the same time, applying a high reverse potential to its base coupling diode, CR 39. After approximately 500 microseconds, capacitor C23 discharges to the point where Q16 begins to conduct. As a result, transistor Q16 capacitively couples a reduced emitter potential to Q15 causing it to conduct less. As Q15's collector voltage decreases, the base of Q16 is driven more negative, which increases the conduction of Q16 and cuts off Q15. After approximately 500 more microseconds, C23 charges sufficiently to allow Q15 to begin conducting once again. Regenerative action quickly saturates Q15 which cuts off Q16 and the cycle continues.

The square wave output is combined with the blanking signal from the Sawtooth generator and with RF Markers to modulate the RF output via the RF Unit's Leveller section. Frequency of the 1 KHz generator may be varied by using the front panel 1 KHz ⊓⊔ screwdriver adjustment.



4.3.8 Power Supplies

When primary power is applied to the Type 6700A, the neon indicator above the switch becomes illuminated to verify operation. As shown in Figure 6-2, the +50 volt, Bias, Varactor and YIG supplies have their rectifiers and filters located on the A4 Assembly. The ± 15 volt and +5 volt rectifiers and filters, with their respective regulators, are located on the A2 Assembly. Also located on the A2 Assembly is the −10 volt supply which is referenced to the +15 volt source.

4.3.8.1 ±15 and −10 Volt Supplies

Each regulated supply consists of a dc source, a series control transistor and an amplifier which compares the regulated output voltage with a reference voltage. As indicated in Figure 4-12, the +15 volt supply uses zener diode A2CR5 to establish the reference voltage. The +15 volt supply in turn serves as the reference voltage for both the −10 volt and −15 volt supplies. The −15 volt supply is also used as the current source for the −10 volt supply. An unregulated +50 volts is derived from the same T1 secondary winding as is used for the ±15 volt supplies. Its rectifier and filter are located on the A4 assembly.

4.3.8.2 +5 Volt Supply

The +5 volt supply receives its input voltage from a separate winding on T1. The a.c. voltage is rectified by A2CR10 and filtered by A2C25 before being applied to reference amplifier A2IC2B. Silicon Controlled Rectifier A2Q12, and its associated circuitry, provides over-voltage protection for circuits which use the +5 volt supply.

4.3.8.3 Bias Supply and Tuning Supply

The Bias Supply and Tuning Supply, respectively, supply the bias voltage and the unregulated DC for YIG tuned RF oscillators located in most of the RF Units. Operation of the RF oscillator is covered in the RF Unit Instruction Manual.

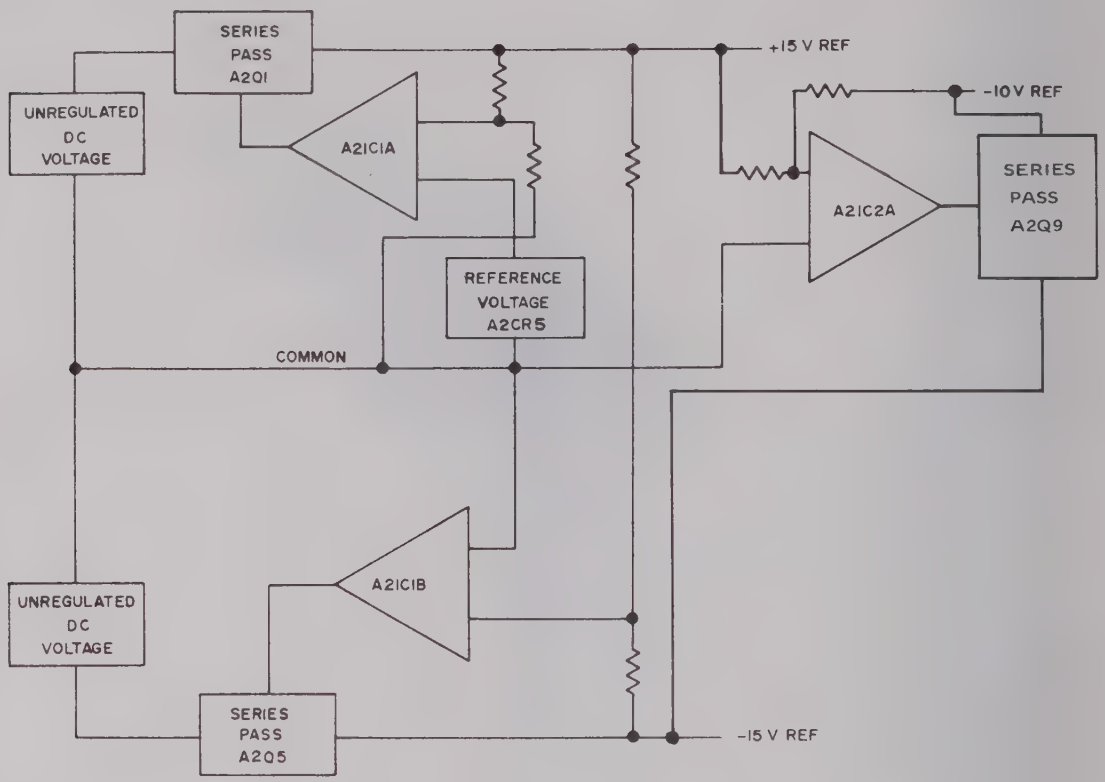


Figure 4-12. ±15 Volt and −10 Volt Power Supply Block Diagram

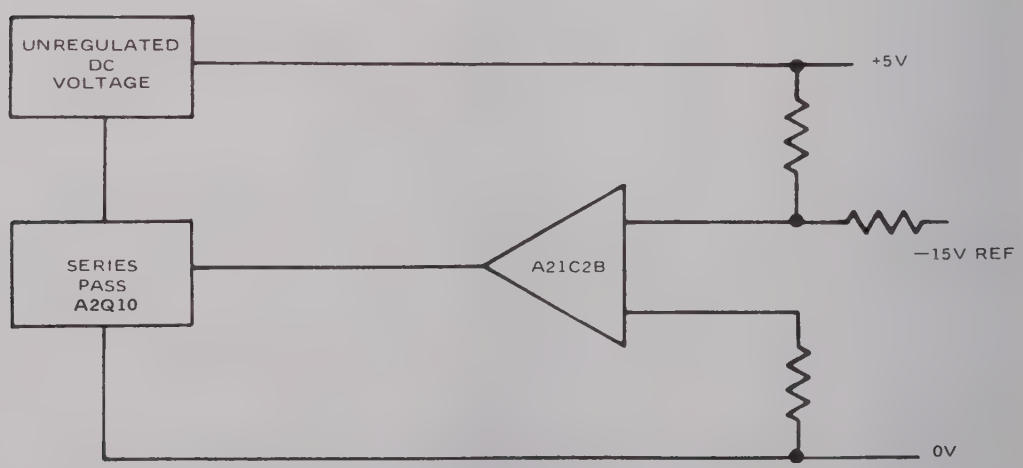


Figure 4-13. +5 Volt Power Supply Block Diagram

SECTION 5
MAINTENANCE

5.1 INTRODUCTION

This section provides the information required to maintain and service the Type 6700A Sweep Oscillator (Mainframe) and contains a list of the required test equipment, a performance check, calibration and alignment procedures, and a replaceable parts list.

5.2 REQUIRED TEST EQUIPMENT

Test equipment, other than those items listed in Table 5-1, may be used if its specifications equal or exceed the required characteristics. The equipment required to perform the calibration is listed in Table 5-2.

N.B. USE ONLY RECENTLY CALIBRATED TEST EQUIPMENT.

5.3 PERFORMANCE TESTS

The following performance tests are performed to verify whether the Type 6700A is operating within its specifications as listed in Table 1-1. The tests should be used as part of the incoming quality control inspection, as a periodic operational check, or after maintenance and service has been performed.

NOTE

An RF unit must be installed in the Mainframe before starting the following performance tests.

5.3.1 Frequency Accuracy

a. Connect equipment as shown in Figure 5-1.

b. Set Type 6700A controls as follows:

Front Panel

TRIGGER	Line
MARKER AMPLITUDE	Clockwise
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	.1
F1	Low Limit
F2	High Limit
1 KHz ⊓⊔	Off (down)
POWER	On

Rear Panel

SWEEP RESPONSE TIME	AUTO
RF MARKERS	ON

c. Check that the cooling fan on the rear of the Mainframe is operating.

RF	ON
If the RF Unit has Option-1 (internal levelling) set:	
LEVELLER MODE	INT (depress)
RF LEVEL	Adjust anticlockwise until levelling is obtained across the entire band
If the RF Unit does not have Option-1 set:	
LEVELLER MODE	OFF (depress)
RF LEVEL	Fully clockwise

d. Set the M1 and M2 indicators at the frequencies to be checked and adjust the MARKER AMPLITUDE as desired.

e. Tune the frequency meter to make its dip coincide with each marker dip in turn.

f. Observe that the frequency indicator and the frequency meter indications fall within frequency accuracy limits of the RF Unit specifications.

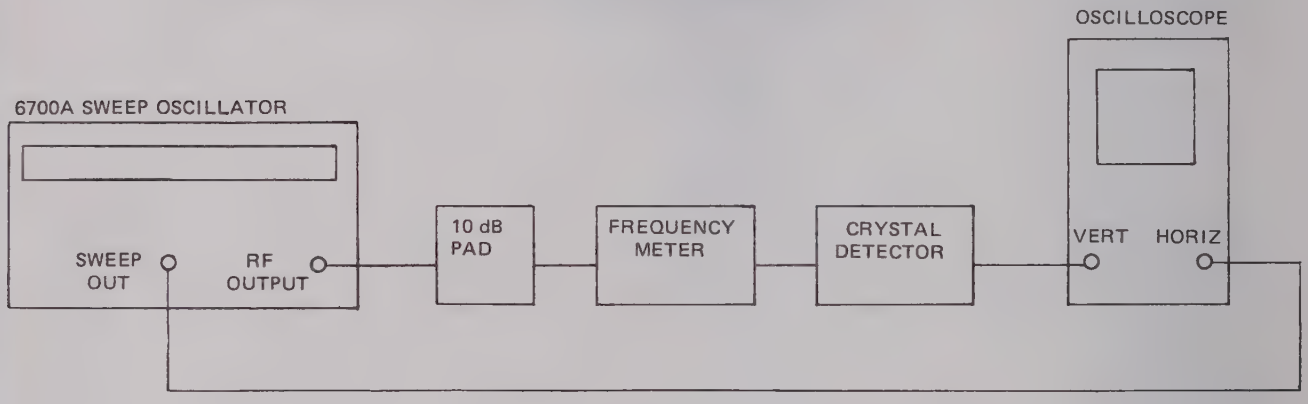


Figure 5-1. Frequency Accuracy Measurement Test Setup

5.3.2 Power Output (Unlevelled)

a. Connect the power meter to the RF OUTPUT connector through a 10 db pad. Do not use intervening cabling.

b. Set Type 6700A controls as follows:

SWEEP FUNCTION	CW M1
1 KHz ⊓⊔	Off (down)
RF LEVEL	Fully clockwise
LEVELLER MODE	OFF

c. Adjust the M1 control across the band and note the minimum output power level indicated on the power meter.

continued on page 5-4

TABLE 5-1. REQUIRED TEST EQUIPMENT FOR PERFORMANCE TESTS		
Title	**Requirements**	**Suggested Manufacturer and Model No.**
Variable Transformer	at least 105 to 250 VAC 2 AMP	Zenith "Variac", Model V3–G2
AC Voltmeter	at least 105–250 VAC ±2½% 48–62 Hz	Salford Electrical, Selectest-Super 50
Oscilloscope	Vertical: DC to at least 300 kHz	Tektronix 561A with 2A63 Differential Amp 1 and 2B67 Time Base
Frequency Meter, Reaction Type		
200–500 MHz	±0.1% accuracy	Narda 804
500–1000 MHz	±0.1% accuracy	Narda 805
1–2 GHz	±0.1% accuracy	General Microwave N607
1–4 GHz	±0.1% accuracy	General Microwave N604
2.6–8.2 GHz	±0.1% accuracy	MI/Sanders 6049/1
5.3–18GHz	±0.1% accuracy	MI/Sanders 6049/2
10 dB Attenuator Pad	Calibrated within ±0.1 dB	MI/Sanders 6534/3
RF Power Meter with Thermistor Mount		
0.2 to 8.2 GHz	±0.3 dB	HP 432A with HP 478A
8.2 to 12.4 GHz		HP X486A with coaxial to waveguide adaptor
12.4 to 18 GHz		HP P486A with coaxial to waveguide adaptor
Directional Coupler	10 dB coupling factor	
30 to 1000 MHz	20 dB directivity	Anzac DCG10
500 to 1000 MHz		Weinschel Model 1540
1–2 GHz		Weinschel Model 1541
2–4 GHz		Weinschel Model 1542
4–8 GHz		Weinschel Model 1543
8–12.4 GHz		Weinschel Model 1544
12.4–18 GHz	15 db directivity	Narda Model 4016–10
Pulse Generator	±10 Volt, less than 1 microsecond rise time 10 to 1000 Hz	Marconi Instruments, TF 2010
Ohmmeter	DC continuity	Salford Electrical, Selectest Super 50
Crystal Detector	400 MHz–18 GHz	MI/Sanders 6160

TABLE 5-2. REQUIRED TEST EQUIPMENT FOR CALIBRATION PROCEDURES		
Title	**Requirements**	**Suggested Manufacturer and Model No.**
Precision DC Digital Voltmeter	±0.01% accuracy, 400 K minimum resistance 1 millivolt sensitivity	Dana Series 4400

NOTE

Power meter and pad calibration factors must be taken into account when checking the power output level.

d. The minimum power indication should be equal to or higher than the minimum power output level (mW) as specified in the RF Unit specifications*.

5.3.3 Power Variation (Levelled)

5.3.3.1 Internal Levelling

a. Connect a power meter to the RF OUTPUT connector through a 10 dB pad. Do not use intervening cable.

b. Set Type 6700A controls as follows:

MARKER AMPLITUDE	Fully anticlockwise
SWEEP FUNCTION	F1-F2
SWEEP TIME	MAN
F1	Low end of band
F2	High end of band
1 KHz ⊓⊔	Off (down)
LEVELLER MODE	INT

c. Simultaneously adjust the RF LEVEL control anticlockwise just enough to keep the UNLEVELLED indicator extinguished while rotating the SWEEP TIME (SEC) VARIABLE control through its entire range and note maximum and minimum power levels (dB) as indicated on the power meter.

d. The total power variation observed in step c. should not exceed the total variation specified for the RF Unit. The pad calibration factor must be taken into account.

5.3.3.2 External Levelling

a. Connect equipment as shown in Figure 5-2.

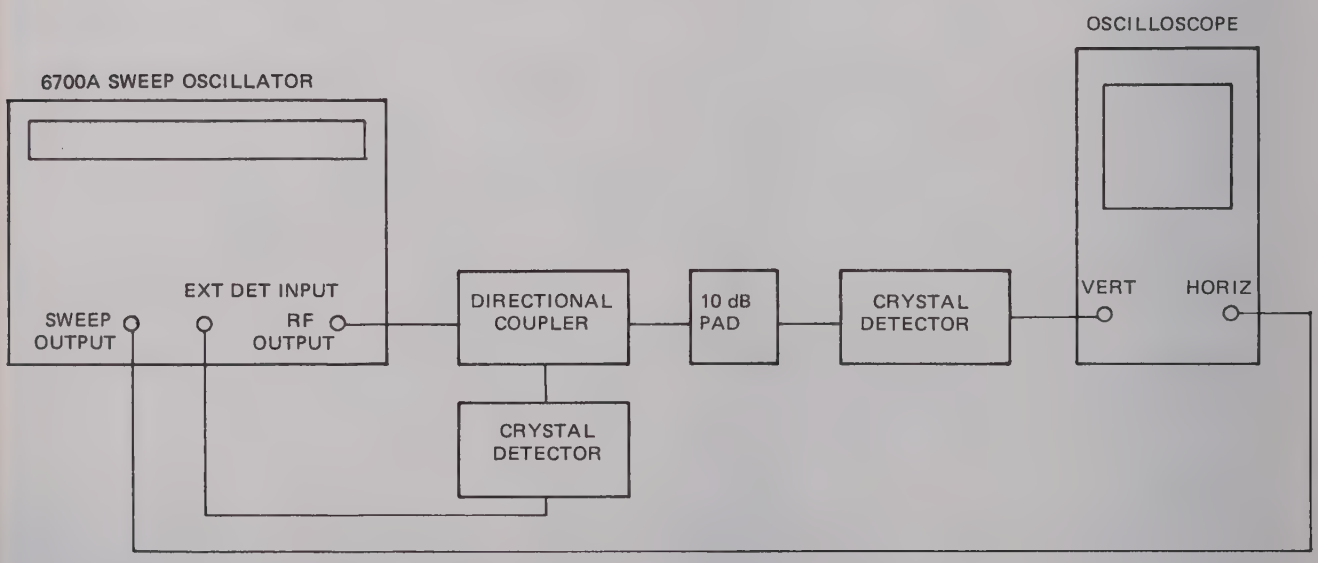


Figure 5-2. External Levelling Measurement Test Setup

*RF Units with Option-1 (internal levelling) have a slightly lower minimum output level than those units which do not include the option.

b. Set Type 6700A controls as follows:

TRIGGER	LINE
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	.01
F1	Low end of band
F2	High end of band
1 KHz ⊓⊔	Off (down)
SWEEP RESPONSE TIME	AUTO
LEVELLER MODE	XTAL EXT*

c. Adjust the RF LEVEL control over its range and then rotate it anticlockwise just enough to obtain levelling across the entire band making sure that the UNLEVELLED indicator remains extinguished.

d. Replace the oscilloscope and crystal detector with an RF Power Meter as shown in Figure 5-3.

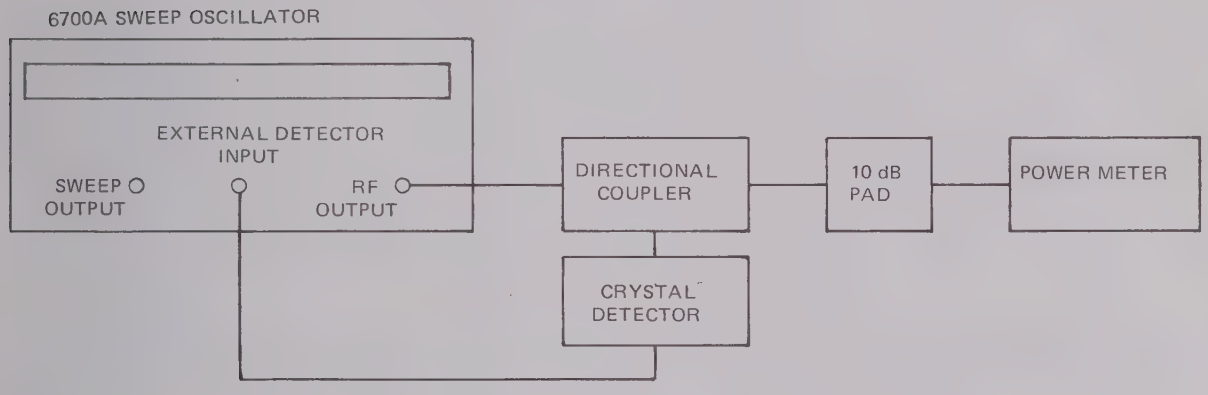


Figure 5-3. External Levelling Measurement Test Setup (2).

e. Set the SWEEP TIME control to MAN.

f. Rotate the VARIABLE SWEEP TIME control through its entire range and note the maximum and minimum power meter indications (dB).

g. The total power variation observed in step f. should not exceed the total variation specified for the RF Unit. The effect of the external crystal detector in addition to the 10 dB pad must be taken into account.

5.3.3.3 Power Meter Levelling

a. Connect equipment as shown in Figure 5-2 with the following exceptions: substitute a power meter (HP Model 432A recommended) for the crystal detector and connect the DC output (recorder output) to the EXT DET INPUT on the Type 6700A.

b. Set Type 6700A controls as follows:

MARKER AMPLITUDE	Fully anticlockwise
SWEEP FUNCTION	F1-F2
SWEEP TIME	MAN

*XTAL/PWR MTR slide switch is located on top left hand side of RF Unit, near the front panel.

F1	Low end of band
F2	High end of band
1 KHz ⊓⊔	Off (down)
LEVELLER MODE	EXT with XTAL/PWR, MTR slide switch set to PWR. MTR

c. Adjust the RF LEVEL control over its range and then rotate it anticlockwise just enough to obtain levelling across the entire band making sure that the UNLEVELLED indicator remains extinguished.

d. Rotate the VARIABLE SWEEP TIME control through its entire range and note the maximum and minimum power meter indications (dB).

e. Maximum power variation should be less than ±0.1 dB.

f. Re-position the XTAL/PWR, MTR, switch to its XTAL setting.

5.3.4 Sweep Trigger

5.3.4.1 Automatic

a. Connect equipment as shown in Figure 5-1 except that the frequency meter may be omitted and the 10 dB pad is connected direct to the crystal detector.

b. Set Type 6700A controls as follows:

TRIGGER	AUTO
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	.1

c. Observe that the sweep is present on the oscilloscope and that the SWEEP ON indicator is illuminated during forward trace.

5.3.4.2 Line Trigger

a. Repeat 5.3.4.1 except set TRIGGER selector to LINE position.

5.3.4.3 Single Sweep

a. Repeat 5.3.4.1 except set TRIGGER selector to SINGLE SWEEP position and the adjacent push-button switch pressed. The sweep should occur once for each time the push-button is pressed.

NOTE

Do not apply external trigger input signals when using the single sweep mode.

5.3.4.4 External Trigger

a. Repeat 5.3.4.1 except set TRIGGER selector to EXT position.

b. Apply any convenient trigger waveform (sine, square, or ramp) to the EXT SWP INPUT located on the rear panel. Duration of the input pulse must be a minimum of 1 microsecond

with any repetition rate between 1 and 100 Hz. Increase amplitude of the input level until a reliable sweep generation is established.

NOTE

Amplitude of the external trigger input signal should not exceed −10 volts.

5.3.5 Internal Square Wave

5.3.5.1 Unlevelled

a. Connect equipment as shown in Figure 5-1 except that the frequency meter may be omitted and the 10 dB pad is connected direct to the crystal detector. Also, remove the cable between the SWEEP OUTPUT on the Type 6700A and the horizontal input on the oscilloscope.

NOTE

The output of the crystal detector (connected to the oscilloscope) should be shunted by a resistor of approximately 600 ohms to reduce the time constant of the crystal detector.

b. Set Type 6700A controls as follows:

1 KHz ⊓⊔	ON
RF LEVEL	Fully anticlockwise
LEVELLER MODE	OFF

c. Using the oscilloscope time base, measure square wave rise time, fall time and period. Both rise and fall times should be 10 microseconds maximum. The period should be adjustable from less than 950 to more than 1050 microseconds.

5.3.5.2 Levelled

a. If the RF Unit has Option-1, use the same equipment setup as used in 5.3.5.1 and set the Type 6700A controls as follows:

LEVELLER MODE	INT
1 KHz ⊓⊔	ON
RF LEVEL	Rotate anticlockwise until UNLEVELLED indicator just goes out.

b. If the RF Unit does not have Option-1, set the controls as described in step a. except that the LEVELLER MODE must be set to XTAL EXT.

c. Connect equipment as shown in Figure 5-2.

d. Using the oscilloscope time base, measure both rise and fall time and symmetry. Rise and fall time should each be 10 microseconds maximum; symmetry within 60:40.

5.3.6 External AM

a. Connect equipment as shown in Figure 5-2.

b. Set Type 6700A controls as follows:

1 KHz ⊓⊔	Off (down)
RF LEVEL	Mid range (approximate)
LEVELLER MODE	OFF

c. Connect the output from a square wave generator to the rear panel AM Input. Adjust amplitude so that a further increase does not increase the RF amplitude. A positive voltage increases the output power if the RF LEVEL control is not fully anticlockwise, while a negative voltage decreases the output power.

d. Rise and fall time should not exceed 1 microsecond; maximum amplitude into the AM input connector should not exceed either +10 or −10 volts.

e. Set Type 6700A controls as follows:

LEVELLER MODE	INT
1 KHz ⊓⊔	Off (down)
RF LEVEL	Fully anticlockwise

f. Repeat step c. and check that rise and fall times do not exceed 2 microseconds.

5.3.7 Symmetrical Sweep Width Accuracy

a. Connect equipment as shown in Figure 5-1.

b. Set Type 6700A controls as follows:

TRIGGER	LINE
SWEEP FUNCTION	SYM M1
SWEEP TIME (SEC)	.1
M1	Centre of band
RF LEVEL	Fully clockwise
LEVELLER MODE	OFF
SWEEP RESPONSE TIME	AUTO

c. At each setting of the SYMMETRICAL SWEEP WIDTH control to be checked (depending on RF Unit) tune the frequency meter to both the high and the low end of the frequency range being swept and note the two different frequency readings.

d. The difference between the two frequency meter readings and the corresponding frequency limits of the calibrated settings of the SYMMETRICAL SWEEP WIDTH control should be within ±3% for YIG tuned RF Units and ±10% for Varactor tuned RF Units.

5.3.8 Residual FM

a. Connect equipment as shown in Figure 5-1.

b. Set Type 6700A controls as specified in 5.3.7 step b, and rotate SYMMETRICAL SWEEP WIDTH control to a convenient narrow setting.

c. Calibrate the frequency meter as a discriminator as follows: Tune the frequency meter so that its dip is centred in the oscilloscope display as shown in Figure 5-4. Place a straight edge on the display and measure the maximum slope of the frequency meter dip. Divide the vertical measurement to obtain the discriminator constant in millivolts/KHz.

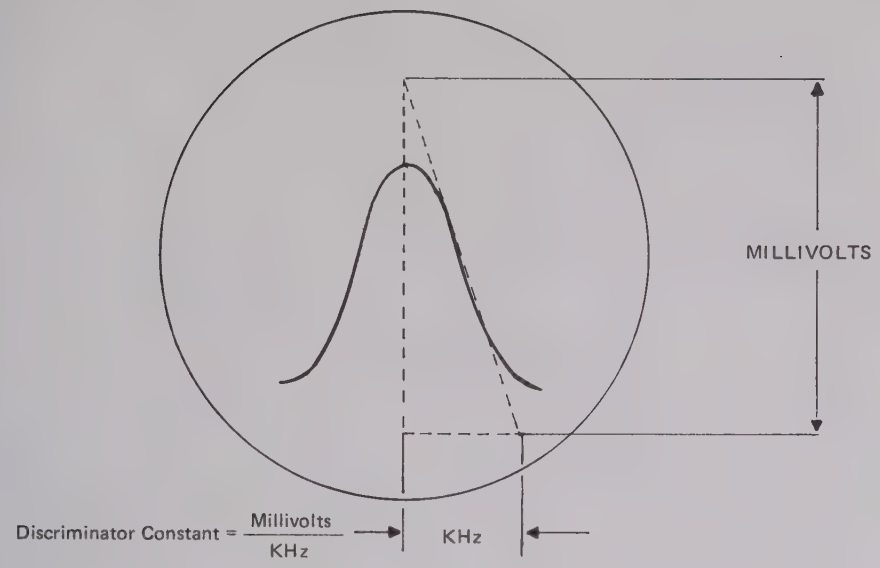


Figure 5-4. Slope Discriminator Display

d. Leave SWEEP FUNCTION switch set to SYM M1.

e. Set SWEEP TIME (SEC) switch to MAN and rotate the VARIABLE (vernier) control fully anticlockwise.

f. Rotate SYMMETRICAL SWEEP WIDTH control (on RF Unit) fully anticlockwise for narrowest sweep width.

g. Increase the oscilloscope vertical sensitivity and tune the frequency meter for maximum peak-to-peak vertical amplitude. The oscilloscope time base should be used. Record the peak-to-peak amplitude.

h. Divide the peak-to-peak amplitude figure by the discriminator constant to obtain KHz peak-to-peak. Then divide by 2 to obtain peak residual FM. This should not exceed the specification for the RF Unit being used.

NOTE

To ensure that the auto bandwidth circuitry is functioning properly, place the SWEEP RESPONSE TIME slide switch (on rear panel) to FAST. The residual FM should increase considerably. Then set the switch back to AUTO. Within a few seconds, the residual FM should decrease to its minimum value indicating that the bandwidth has been reduced.

5.3.9 Blanking Output

a. Connect the rear panel BLANKING OUTPUT to the oscilloscope vertical input.

b. Set Type 6700A controls as follows:

TRIGGER	LINE
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	0.1

c. Output should be at least −5 volts (coincident with sweep retrace).

5.3.10 Marker Video Output

a. Connect the rear panel MARKER OUTPUT to the oscilloscope vertical input.

b. Type 6700A controls as follows:

MARKER AMPLITUDE	Fully clockwise
TRIGGER	LINE
SWEEP FUNCTION	F1-F2
F1	Low end of band
F2	High end of band
M1 and M2	Within band
SWEEP TIME (SEC)	.1

c. Output should be at least −5 volts.

5.3.11 Pen Lift

a. Connect an ohmmeter to the rear panel PEN LIFT TERMINALS.

b. Set Type 6700A controls as follows:

TRIGGER	LINE
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	10

c. Ohmmeter should indicate continuity during forward trace; open during retrace.

5.3.12 Proportional Sweep Amplitude

a. Connect the PROPORTIONAL OUTPUT to the oscilloscope vertical input.

b. Set Type 6700A controls as follows:

TRIGGER	LINE
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	0.1
F1	Lower limit
F2	Upper limit
PROPORTIONAL	10V/BAND

c. The PROPORTIONAL OUTPUT voltage should start at +0.25 (±0.25) volt and finish at +9.75 (±0.25) volts.

d. Set the rear panel PROPORTIONAL switch to 40 V/OCTAVE.

e. The PROPORTIONAL OUTPUT voltage should now start at +1 (±1) volt and finish at +40 (±3) volts.

5.4 CALIBRATION PROCEDURES

5.4.1 Reference Power Supplies

NOTE

The following measurements of power supply outputs should be made with a precision D.C. Digital Voltmeter.

a. Remove the RF Unit from the Mainframe.

b. Connect a jumper lead of insulated 16/0.2mm wire, about 25cm. long, between A1TP12 (see Fig.6-3) and chassis ground at the top of the bracket which supports the RF Unit connector.

c. Set Mainframe controls as follows:-

F1, M1, M2, F2	Nominal low end of Scale
SWEEP TIME (SECS)	0.1
Variable	Fully clockwise
1 KHz⊓⊔	OFF
TRIGGER	EXT.
SWEEP FUNCTION	CW M1

d. Connect the Digital Voltmeter (DVM) between A1TP12 (ground) and A5TP3 (see Fig. 5-6).

e. Switch on, observe that the DVM reads approximately −10 volts, and allow 30 minutes for thorough warming up before proceeding with calibration.

f. Adjust A2R10 for a DVM reading of −10.000 (±0.001) volts.

g. Turn Function Selector switch to F1-F2.

h. Connect a short jumper lead between A1TP2 and A1TP12.

j. Adjust A1R51 until the DVM, still connected between A1TP12 and A5TP3, reads −10.000 (±0.001) volts.

k. Remove the jumper between A1TP2 and A1TP12, but leave the other one, between ATP12 and ground, in place.

l. Connect DVM between A1TP12 (ground) and A2TP1. The meter should read −15.000 (±0.020) volts.

m. Connect DVM between A1TP12 (ground) and A2TP3. The meter should read +15.000 (±0.020) volts.

n. Connect DVM between A1TP12 (ground) and A2TP4. The meter should read +5.0 (±0.3) volts.

5.4.2 Dial Mechanism Calibration

a. Set F1, M1, M2 and F2 indicators exactly at the nominal low end of the frequency scale as illustrated in Fig. 5-5.

b. Set SWEEP FUNCTION selector to F1-F2, leaving TRIGGER selector at EXT.

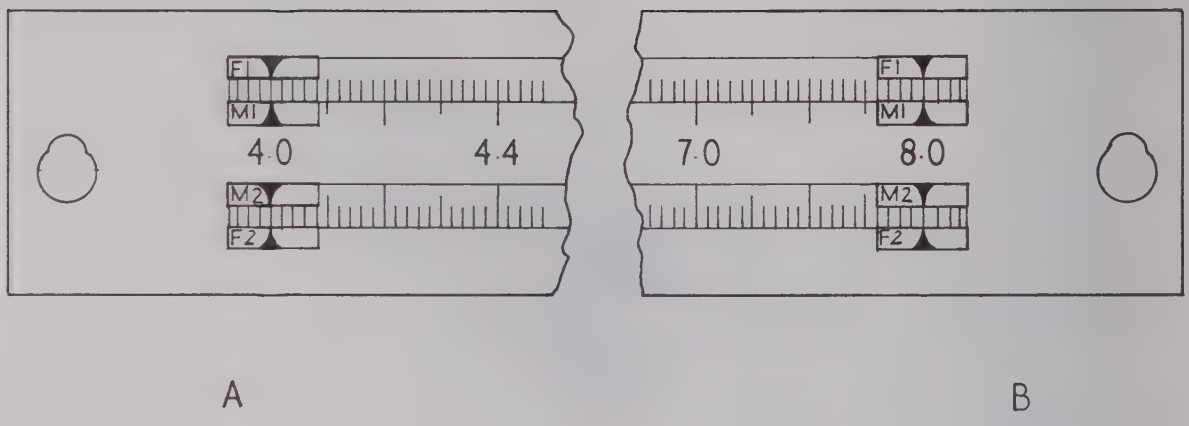


Figure 5-5. Dial Mechanism Calibration Settings. (Nominal 4.0–8.0 GHz scale illustrated with pointers set to either 4.00 GHz or 8.00 GHz.

c. M1 Low Adjustment – connect DVM between A1TP12 (ground) and A5TP5 and adjust A5R6 for –0.328 (±0.005) volt.

d. M1 High Adjustment – set M1 exactly to the nominal high end of the frequency scale and adjust A5R5 for –9.672 (±0.005) volts.

e. Set M1 to nominal low end of scale and repeat c. if necessary.

f. M2 Low Adjustment – connect DVM between A1TP12 and A5TP6 and adjust A5R3 for –0.328 (±0.005 Volt).

g. M2 High Adjustment – set M2 exactly to the nominal high end of the scale and adjust A5R4 for –9.672 (±0.005) volts.

h. Set M2 to nominal low end of scale and repeat f., if necessary.

j. F1 Low Adjustment – connect DVM between A1TP12 and A5TP4. Set SWEEP FUNCTION to M1-M2 and adjust A5R7 for –0.328 (±0.005) volt.

k. F1 High Adjustment – set F1 exactly to the nominal high end of the scale and adjust A5R8 for –9.672 (±0.005) volts.

l. Set F1 to nominal low end of scale and repeat j if necessary.

m. F2 Low Adjustment – connect DVM between A1TP12 and A5TP7 and adjust A5R2 for –0.328 (±0.005) volt.

n. F2 High Adjustment – set F2 to nominal high end of scale and adjust A5R1 for –9.672 (±0.005) volts.

p. Set F2 to nominal low end of scale and repeat m if necessary.

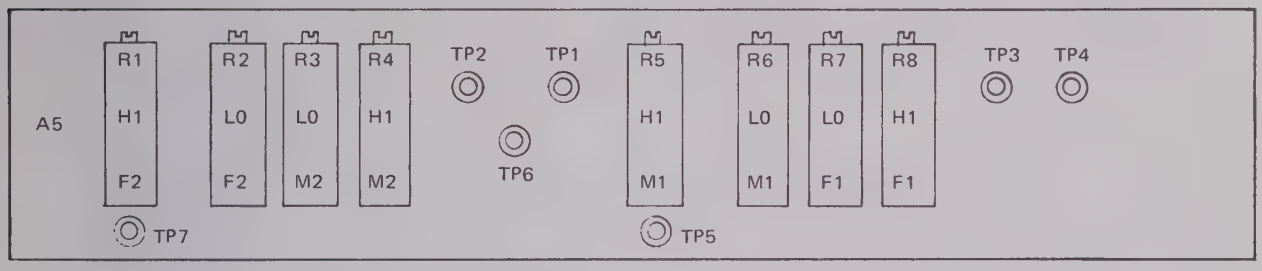
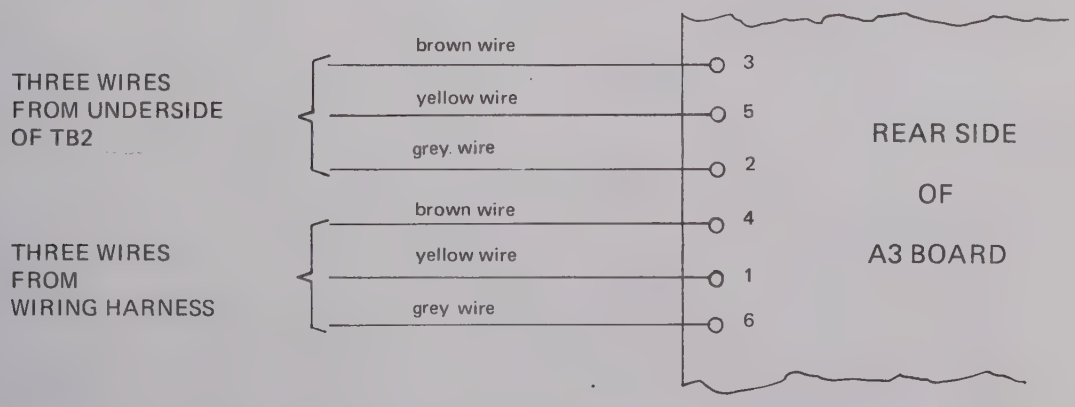


Fig. 5-6. Test Point and Adjustment Locations, Assembly A5

5.4.3 Remote Digital Frequency Programming (Option 01) – Installation and adjustment

a. Fit a Remote Digital Frequency Programming Board (A3) into Mainframe jack J3 (See Figure 6-1) and perform the following wiring changes before proceeding to step b.

After installing an A3 board, remove the six quick disconnect wires from TB2 and reconnect them to quick disconnect pins 1 to 6 on the rear of the A3 board. Three of these wires come from the underside of TB2 and three come from a wiring harness. Connect these wires to the six quick disconnect pins on the A3 board as indicated in the following sketch:

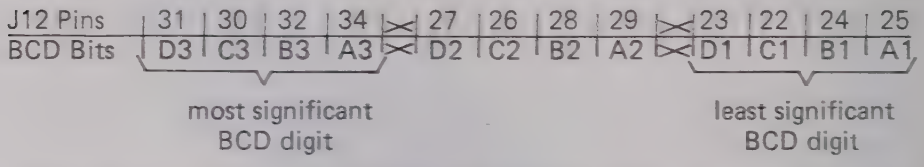


Remove the jumper from between terminals 1 and 2 on TB1 (Rear Panel of Mainframe). This is marked: "FOR OPTION 01 REMOVE JUMPER".

b. Set controls as follows:

TRIGGER	EXT
MARKER AMPLITUDE	Fully clockwise
SWEEP FUNCTION	EXT/M1
SWEEP TIME (sec)	MAN
1 KHz ⊓⊔	OFF

c. Apply decimal 000 (BCD 0000-0000-0000), logic level "O's" to pins as indicated on the 36 pin REMOTE PROGRAMMING INPUT CONNECTOR (J12) located on the rear panel.


J12 Pins
31 30 32 34 27 26 28 29 23 22 24 25
BCD Bits
D3 C3 B3 A3 D2 C2 B2 A2 D1 C1 B1 A1
most significant BCD digit
least significant BCD digit

d. Enter the BCD input into the latches by applying a logic "0" (Ground) to J12, pin 21 (Remote Enable) and a logic "1" (+5 volts or an open circuit) to J12, pin 20 (Strobe).

e. Connect a precision voltmeter between A3TP1 (A/D converter output) and A3TP2 (Analog Ground) and adjust A3R2 to obtain an indication of 0.000 (±0.001) volts. (Looking at the component side of the A3 board, A3TP1 is a quick disconnect pin located to the immediate left of A3R1)

f. Apply decimal 967 (BCD 1001-0110-0111) to J12 connector pins (refer to step c.) and adjust A3R1 to obtain a voltmeter indication of 9.670 (±0.001) volts between A1TP12 (ground) and A1TP15 (see Fig. 6–1).

g. Apply decimal 033 (BCD 0000-0011-0011) to J12 connector pins. Keep the voltmeter leads between A1TP12 and A1TP15 and adjust A3R3 to obtain an indication of 0.033 (±0.001) volts.

h. Repeat f. and g. several times until the required accuracy of setting is obtained. A3R1 and A3R3 are slightly interdependent.

i. Calibration of the A3 board is now completed.

j. Disconnect all inputs to J12.

5.5 ALIGNMENT PROCEDURES

5.5.1 Waveform Generator Alignment

a. The jumper between A1TP12 and chassis ground should still be connected.

b. Set M2 and F2 at their upper mechanical stops.

c. Set M1 and F1 at the nominal high end of the scale.

d. Connect precision voltmeter between A1TP12 (ground) and A5TP5.

e. Set SWEEP FUNCTION to CW M1 and record meter reading.

f. Connect voltmeter between A1TP12 and A1TP15 and adjust A1R61 for exactly the same reading as in e, but of opposite polarity.

g. Connect voltmeter between A1TP12 and A5TP5.

h. Set SWEEP FUNCTION to M1-M2 and record meter reading.

j. Connect voltmeter between A1TP12 and A1TP15 and adjust A1R55 for exactly the same reading as in h, but of opposite polarity.

k. Repeat d to j until correct agreements are obtained within ±0.002 volt.

l. Leaving F2 and M2 at their upper mechanical stops, set F1 and M1 exactly at the nominal low end of the scale.

m. Connect voltmeter between A1TP12 and A1TP15.

n. Set SWEEP FUNCTION to CW M1, M1-M2, and F1-F2 positions, recording each reading in turn. All readings should be 0.328 (±0.005) volt. In addition, CW M1 and M1-M2 readings should be within ±0.002 volt of each other.

5.5.2 Marker Alignment

a. Connect the SWEEP OUT to the oscilloscope horizontal input.

b. Connect the rear panel MARKER VIDEO OUTPUT to the oscilloscope vertical input.

c. Set Type 6700A controls as follows:

MARKER AMPLITUDE	Clockwise
SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	.1
TRIGGER	AUTO
M1	Exactly mid-band
F2	One scale division higher than M1 setting
F1	One scale division lower than M1 setting
M2	Fully clockwise

d. Adjust A1R94 so that the M1 marker appears at the centre of the oscilloscope display.

e. Rotate M1 fully clockwise and position the M2 marker to exactly mid-band.

f. Adjust A1R92 so that the M2 marker appears at the centre of the oscilloscope display.

g. Using the calibrated oscilloscope display, check that the amplitude of both markers is a minimum of −5 volts.

5.5.3 Internal Square Wave Alignment

a. Set Type 6700A controls as follows:

SWEEP FUNCTION	F1-F2
SWEEP TIME (SEC)	.1
1 KHz ⊓⊔	ON

b. Connect the oscilloscope vertical input to A1TP16 and chassis ground.

c. Using the oscilloscope time base, measure the rise and fall time of the 1 KHz square wave. Both rise and fall time should not exceed 10 microseconds.

d. Front panel screwdriver adjustment R5 varies the 1 KHz period from below 950 to above 1050 microseconds. While observing the oscilloscope, adjust the period for 1000 μsec (1 ms).

e. Amplitude of the square wave as indicated on the oscilloscope should be 12 (±3) volts peak-to-peak.

5.6 Servicing

Removing the top cover of the Mainframe provides access to its interior. The plug-in printed circuit boards (See Figure 6-1) may then be readily exchanged or checked. Functions of the P.C. boards are as follows:

Front board, A1 – Waveform Generator for sweep, markers and square wave.
Second board, A2 – Power Supply Regulator Circuits
Third board, A3 (if Option −01 is included) – Remote Programming.

Removing both top and bottom covers provides access to test points while the equipment is operating.

The following is a list of Figures which illustrate the locations of the various components and test points:

Figure 5-7	Main assembly components – inside of front and rear panels
Figure 6-3	Assembly A1 components and test points
Figure 6-7	Assembly A2 components and test points
Figure 6-9	Assembly A3 components and test points
Figure 6-1	Assembly A4 components and test points
Figure 5-7	Assembly A5 components

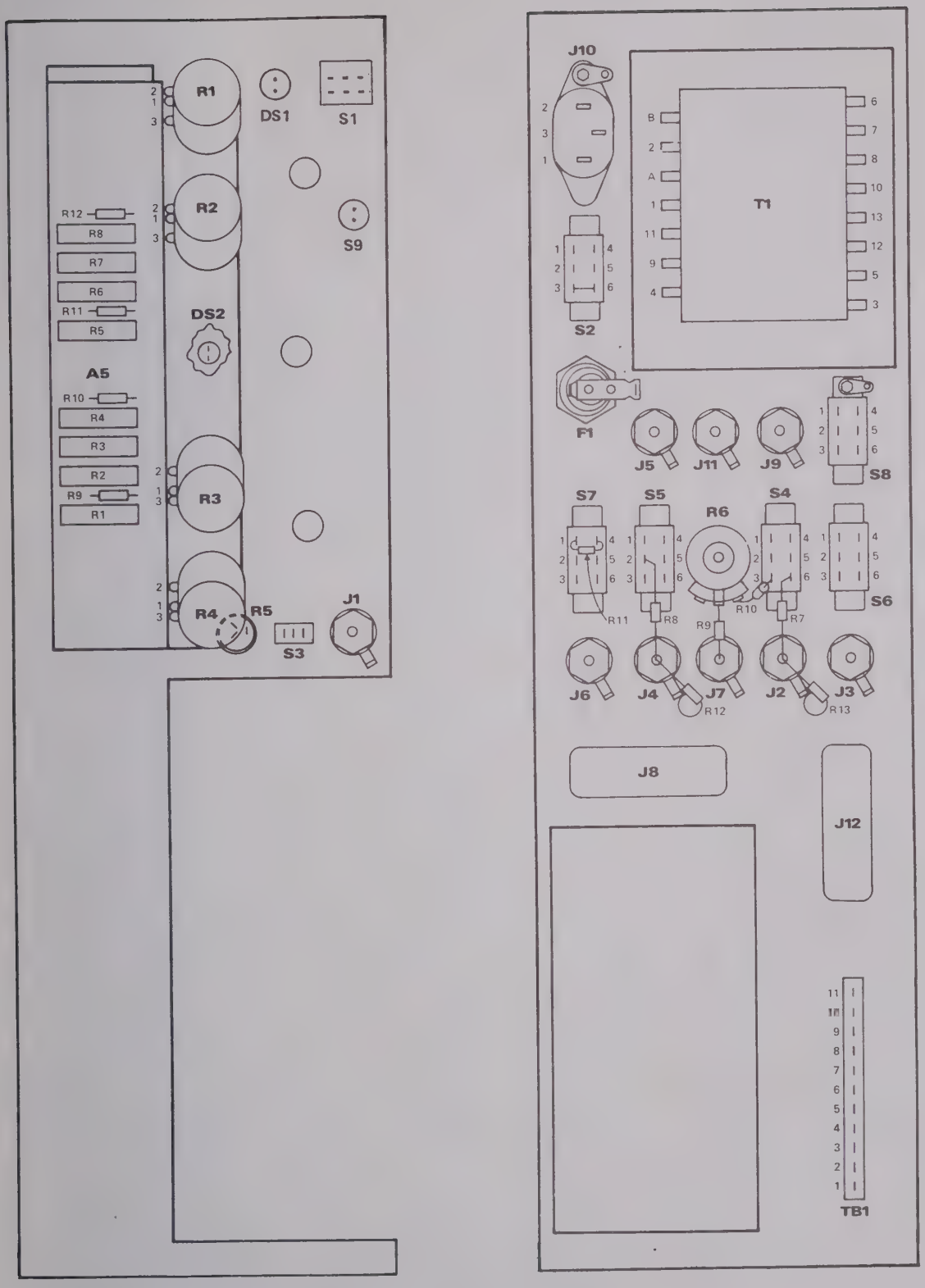


Figure 5-7. Identification of Main Assembly Components Located on Front and Back Panels.

5.7 Replaceable Parts List

Replaceable parts, including all those subject to burnout, breakage, or deterioration during normal operation of the Type 6700A, are listed in Tables 5-3 to 5-8. While equivalent alternatives to some components may be included during manufacture, Marconi Instruments Ltd., Sanders Division, should be consulted before any other alternatives are fitted when the equipment is being serviced.

Table 5-3. Main Assembly Parts List

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
DS1	Indicator, Neon		125V	R/S Components	S.M.Ind.(Red)
DS2	Indicator,L.E.D.			F.R.Electronics	MOSL-6L (Red)
F1	Fuse link 20mm x 5mm	Anti-surge	1.6A(230V) 3.15A(115V)		
J1	Connector,BNC			Greenpar	GE35027/BN
J2	Connector,BNC			Greenpar	GE35027/BN
J3	Connector,BNC			Greenpar	GE35027/BN
J4	Connector,BNC			Greenpar	GE35027/BN
J5	Connector,BNC			Greenpar	GE35027/BN
J6	Connector,BNC			Greenpar	GE35027/BN
J7	Connector,BNC			Greenpar	GE35027/BN
J8	Connector, 36 pin			Amphenol	57-20360
J9	Connector,BNC			Greenpar	GE35027/BN
J10	Plug,line input			Bulgin	P580
J11	Connector,BNC			Greenpar	GE35027/BN
J12	Connector, 36 pin			Amphenol	57-40360
J14	Connector, 5 pin			Amphenol	126-218
P1	Connector, 22+22 pin			Cinch	50/83/109/22/GF
P2	Connector, 22+22 pin			Cinch	50/83/109/22/GF
P14	Connector, 5 pin			Amphenol	126-217
R1	Res.Var., 1K,lin.	10%	2W	Bourns	M.I.Drg.6700/100
R2	Res.Var., 1K, lin.	10%	2W	Bourns	M.I.Drg.6700/100
R3	Res.Var., 1K, lin.	10%	2W	Bourns	M.I.Drg.6700/100
R4	Res.Var., 1K. lin.	10%	2W	Bourns	M.I.Drg.6700/100
R5	Res.Var., 1K, lin.	10%	1W	Spectrol-Reliance	CW52M
R6	Res.Var., 10K, lin.	20%	1/2W	AB Controls	Type 45
R7	Res.4.7K	2%	0.4W	Mullard	MR25
R8	Res.4.7K	2%	0.4W	Mullard	MR25
R9	Res.2.2K	2%	0.4W	Mullard	MR25

Table 5-3. Main Assembly Parts List continued

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
R10	Res.2.2K	2%	0.4W	Mullard	MR25
R11	Res.22K	2%	0.4W	Mullard	MR25
R12	Res.4.7K	2%	0.4W	Mullard	MR25
R13	Res.4.7K	2%	0.4W	Mullard	MR25
S1	Switch,toggle			Arrow	CTS.6
S2	Switch,slide			Arcolectric	T.225
S3	Switch,toggle			Arrow	CTS.3
S4	Switch,slide			Arcolectric	T.225
S5	Switch,slide			Arcolectric	T.225
S6	Switch,slide			Arcolectric	T.225
S7	Switch,slide			Arcolectric	T.225
S8	Switch,slide			Arcolectric	T.225
S9	Switch,push-button			Bulgin	MP.16(Red)
T1	Transformer, power				M.I.Drg.6700/300
TB1	Terminal block			Kulka	410-Y-11
TB2	Terminal board				M.I.Drg.6700/206
B1	Fan		115V	Rotron	"Piccolo"
	Fuse-holder			Bulgin	F.296
	Jumper link for TB1			Kulka	410-J
F1,M1,M2,F2	Control knob			Elma	70-14-1/4 Black
Trig.,Function Time	Control knob			Elma	73-21-1/4 Black
Markers,Time (var.)	Control knob			Elma	71-14-1/8 Red
Sweep Out	Control knob			Elma	71-14-1/4 Black
Sweep Out	Nut cover			Elma	1455-14 Black
F1,M1,M2,F2 Sweep	Nut cover			Elma	1454-14 Black
Function	Knob cap			Elma	1450-21 Black
Markers, Time	Knob cap			Elma	1450-14 Red
Sweep Out	Knob cap			Elma	1450-14 Black
F1, M1, M2, F2	Knob cap			Elma	1450-14 Black
	Mains Lead (Line Cord)			Marconi Instruments	M.43123-076
	Screw, scale retaining			Marconi Instruments	Drg.6700/058
	Extender board Assembly (optional accessory)			Marconi Instruments	Drg.6700/241

Table 5-4. Assembly A1 Marker & Waveform Generator, 6700/201

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A1C1	Cap.1000pF	±10%	200V	Vitramon	CK05BX102K
A1C2	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A1C3	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A1C4	Cap.1000pF	±10%	200V	Vitramon	CK05BX102K
A1C5	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A1C6	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A1C7	Cap.100uF	−10/+50%	25V	Erie	201 series
A1C8	Cap.100uF	−10/+50%	25V	Erie	201 series
A1C9	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A1C10	Cap.1000pF	±10%	200V	Vitramon	CK05BX102K
A1C11	Cap.2200pF	±10%	200V	Vitramon	CK06BX222K
A1C12	Cap.4700pF	±10%	200V	Vitramon	CK06BX472K
A1C13	Cap.470pF	±10%	200V	Vitramon	CK05BX471K
A1C14	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A1C15	Cap.100uF	−10/+50%	25V	Erie	201 series
A1C16	Cap.15pF	±10%	200V	Vitramon	CK05BX150K
A1C17	Cap.3.3pF	±0.5pF	250V	Erie	Type 861
A1C18	Cap.47pF	±10%	200V	Vitramon	CK05BX470K
A1C19	Cap.15pF	±10%	200V	Vitramon	CK05BX150K
A1C20	Cap.100uF	−10/+50%	25V	Erie	201 series
A1C21	Cap.3.3pF	±0.5pF	250V	Erie	Type 861
A1C22	Cap.47pF	±10%	200V	Vitramon	CK05BX470K
A1C23	Cap.0.1uF	±10%	100V	Vitramon	CK06BX104K
A1C24	Cap.Tant.1uF	±20%	35V	I.T.T.	TAG 1.0/35
A1C25	Cap.22pF	±10%	500V	Erie	Type 861
A1C26	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A1C27	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A1C28	Cap.22pF	±10%	200V	Vitramon	CK05BX220K
A1C29	Cap.22pF	±10%	200V	Vitramon	CK05BX220K
A1C30	Cap.0.022 uF	±10%	50V	Vitramon	CK05BX223K
A1CR1	Diode, Zener	5%	6.2V	Mullard	BZY88-C6V2
A1CR2	Diode,rect.			Mullard	IN914
A1CR3	Diode,rect.			Mullard	IN914
A1CR4	Diode,rect.			Mullard	IN914
A1CR5	Diode,rect.			Mullard	IN914
A1CR6	Diode,rect.			Mullard	IN914
A1CR7	Diode,rect.			Mullard	IN914
A1CR8	Diode,rect.			Mullard	IN914
A1CR9	Diode,rect.			Mullard	IN914
A1CR10	Diode,rect.			Mullard	IN914
A1CR11	Diode,rect.			Mullard	IN914
A1CR11	Diode,rect.			Mullard	IN914
A1CR12	Diode,rect.			Mullard	IN914
A1CR13	Diode,rect.			Mullard	IN914
A1CR14	Diode,rect.			Mullard	IN914
A1CR15	Diode,rect.			Mullard	IN914
A1CR16	Diode,rect.			Mullard	IN914
A1CR17	Diode,rect.			Mullard	IN914
A1CR18	Diode,rect.			Mullard	IN914
A1CR19	Diode,rect.			Mullard	IN914
A1CR20	Diode,rect.			Mullard	IN914
A1CR21	Diode,rect.			Mullard	IN914
A1CR22	Not used				
A1CR23	Diode,rect.			Mullard	IN914

Table 5-4. Assembly A1 Marker & Waveform Generator, 6700/201 continued

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A1CR24	Diode,rect.			Mullard	IN914
A1CR25	Diode,rect.			Mullard	IN914
A1CR26	Diode,rect.			Mullard	IN914
A1CR27	Diode,rect.			Mullard	IN914
A1CR28	Diode,rect.			Mullard	IN914
A1CR29	Diode,rect.			Mullard	IN914
A1CR30	Diode,rect.			Mullard	IN914
A1CR31	Diode,rect.			Mullard	IN914
A1CR32	Diode,rect.			Mullard	IN914
A1CR33	Diode,rect.			Mullard	IN914
A1CR34	Diode,rect.			Mullard	IN914
A1CR35	Diode,zener	5%	12V	Mullard	BZY88-C12
A1CR36	Diode,rect.			Mullard	IN914
A1CR37	Diode,rect.			Mullard	IN914
A1CR38	Diode,rect.			Mullard	IN914
A1CR39	Diode,rect.			Mullard	IN914
A1CR40	Diode,rect.			Mullard	IN914
A1CR41	Diode,rect.			Mullard	IN914
A1CR42	Diode,rect.			Mullard	IN914
A1CR43	Diode,rect.			Mullard	IN914
A1CR44	Diode,rect.			Mullard	IN914
A1CR45	Diode,rect.			Mullard	IN914
A1IC1	Integ.Circuit			Motorola	MC1458P-1
A1IC2	Integ.Circuit			Motorola	MC1458P-1
A1IC3	Integ.Circuit			Motorola	MC1458P-1
A1IC4	Integ.Circuit			Motorola	MC1458P-1
A1IC5	Integ.Circuit			Motorola	MC1458P-1
A1IC6	Integ.Circuit			Motorola	MC1437L
A1Q1	Transistor			Motorola	2N 4403
A1Q2	Transistor			Motorola	2N 4403
A1Q3	Transistor			Motorola	2N 4403
A1Q4	Transistor			Motorola	2N 4403
A1Q5	Transistor			Motorola	2N 4403
A1Q6	Transistor			Motorola	2N4401
A1Q7	Transistor			Motorola	2N4401
A1Q8	Transistor			I.T.T.	BSY79
A1Q9	Transistor			Motorola	2N4401
A1Q10	Transistor			Motorola	2N4403
A1Q11	Transistor			Motorola	2N4401
A1Q12	Transistor			Motorola	2N4403
A1Q13	Transistor			Motorola	2N4401
A1Q14	Transistor			Motorola	2N4401
A1Q15	Transistor			Motorola	2N4403
A1Q16	Transistor			Motorola	2N4403
A1Q17	Transistor			Motorola	2N4401
A1R1	Res.4.7M	10%	0.33W	Mullard	CR25
A1R2	Res.10K	2%	0.4W	Mullard	MR25
A1R3	Res.4.7K	2%	0.4W	Mullard	MR25
A1R4	Res. 1K	2%	0.4W	Mullard	MR25
A1R5	Res.470 ohms	2%	0.4W	Mullard	MR25

Table 5-4. Assembly A1 Marker & Waveform Generator 6700/201 continued

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A1R6	Res.1K	2%	0.4W	Mullard	MR25
A1R7	Res.4.7K	2%	0.4W	Mullard	MR25
A1R8	Res.10K	2%	0.4W	Mullard	MR25
A1R9	REs.4.7K	2%	0.4W	Mullard	MR25
A1R10	Res.22K	2%	0.4W	Mullard	MR25
A1R11	Res.22K	2%	0.4W	Mullard	MR25
A1R12	Res.1.5K	2%	0.4W	Mullard	MR25
A1R13	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R14	Res.2.2K	2%	0.4W	Mullard	MR25
A1R15	Res.22K	2%	0.4W	Mullard	MR25
A1R16	Res.4.7K	2%	0.4W	Mullard	MR25
A1R17	Res.68K	2%	0.4W	Mullard	MR25
A1R18	Res.22K	2%	0.4W	Mullard	MR25
A1R19	Res.22K	2%	0.4W	Mullard	MR25
A1R20	Res.68K	2%	0.4W	Mullard	MR25
A1R21	Res.2.2K	2%	0.4W	Mullard	MR25
A1R22	Res.10K	2%	0.4W	Mullard	MR25
A1R23	Res.33K	2%	0.4W	Mullard	MR25
A1R24	Res.10.0K	1%	1/8W	Holco	H8/50
A1R25	Res.10K	2%	0.4W	Mullard	MR25
A1R26	Res.100 ohms	2%	0.4W	Mullard	MR25
A1R27	Res.5.62K	1%	1/8W	Holco	H8/50
A1R28	Res.10 ohms	2%	0.4W	Mullard	MR25
A1R29	Res.10 ohms	2%	0.4W	Mullard	MR25
A1R30	Res.10.0K	1%	1/8W	Holco	H8/50
A1R31	Res.178K	1%	1/8W	Holco	H8/50
A1R32	Res.4.7K	2%	0.4W	Mullard	MR25
A1R33	Res.10.0K	1%	1/8W	Holco	H8/50
A1R34	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R35	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R36	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R37	Res.10K	2%	0.4W	Mullard	MR25
A1R38	Res.10K	2%	0.4W	Mullard	MR25
A1R39	Res.4.7K	2%	0.4W	Mullard	MR25
A1R40	Res.47 ohms	2%	0.4W	Mullard	MR25
A1R41	Res.10K	2%	0.4W	Mullard	MR25
A1R42	Res.470 ohms	2%	0.4W	Mullard	MR25
A1R43	Res.10K	2%	0.4W	Mullard	MR25
A1R44	Res.10K	2%	0.4W	Mullard	MR25
A1R45	Res.4.7K	2%	0.4W	Mullard	MR25
A1R46	Res.15.00K	0.05%	0.1W	ERG	EE-0.10-15K-AC4
A1R47	Res.100 ohms	2%	0.4W	Mullard	MR25
A1R48	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A1R49	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A1R50	Res.1.5M	10%	0.33W	Mullard	CR25
A1R51	Res.Var.10K	10%	0.75W	Spectrol-Reliance	43P
A1R52	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A1R53	Res.3.3K	2%	0.4W	Mullard	MR25
A1R54	Res.1.5M	10%	0.33W	Mullard	CR25
A1R55	Res.Var.10K	10%	0.75W	Spectrol-Reliance	43P
A1R56	Res.100K	1%	1/8W	Holco	H8/50
A1R57	Res.100K	1%	1/8W	Holco	H8/50
A1R58	Res.2.00K	0.05%	0.1W	ERG	EE-0.10-2K-AC4
A1R59	Res.2.00K	0.05%	0.1W	ERG	EE-0.10-2K-AC4

Table 5-4. Assembly A1 Marker & Waveform Generator 6700/201 continued

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A1R60	Res.1M	5%	0.33W	Mullard	CR25
A1R61	Res.var.10K	10%	0.75W	Spectrol-Reliance	43P
A1R62	Res.680 ohms	2%	0.4W	Mullard	MR25
A1R63	Res.2.00K	0.05%	0.1W	ERG	EE-0.10-2K-AC4
A1R64	Res.3.01K	1%	1/8W	Holco	H8/50
A1R65	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R66	Res.2.15K	1%	1/8W	Holco	H8/50
A1R67	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R68	Res.10.0K	1%	1/8W	Holco	H8/50
A1R69	Res.10.0K	1%	1/8W	Holco	H8/50
A1R70	Res.10.0K	1%	1/8W	Holco	H8/50
A1R71	Res.10K	2%	0.4W	Mullard	MR25
A1R72	Res.2.2K	2%	0.4W	Mullard	MR25
A1R73	Res.6.8K	2%	0.5W	Mullard	MR30
ALR74	Res.470 ohms	2%	0.4W	Mullard	MR25
A1R75	Res.100.0K	0.05%	0.1W	ERG	EE-0.10-100K-AC4
A1R76	Res.100.0K	0.05%	0.1W	ERG	EE-0.10-100K-AC4
A1R77	Jumper				
A1R78	Res.1.5M	10%	0.33W	Mullard	CR25
A1R79	Res.47K	2%	0.4W	Mullard	MR25
A1R80	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R81	Res.100K	2%	0.4W	Mullard	MR25
A1R82	Res.2.80K	1%	1/8W	Holco	H8/50
A1R83	Res.2.80K	1%	1/8W	Holco	H8/50
A1R84	Res.10 ohms	2%	0.4W	Mullard	MR25
A1R85	Res.2.80K	1%	1/8W	Holco	H8/50
A1R86	Res.1.40K	1%	1/8W	Holco	H8/50
A1R87	Res.100K	2%	0.4W	Mullard	MR25
A1R88	Res.15K	2%	0.4W	Mullard	MR25
A1R89	Res.1K	2%	0.4W	Mullard	MR25
A1R90	Res.100.0K	0.05%	0.1W	ERG	EE-0.10-100K-AC4
A1R91	Res.100.0K	0.05%	0.1W	ERG	EE-0.10-100K-AC4
A1R92	REs.var.10K	10%	0.75W	Spectrol-Reliance	43P
A1R93	Res.1.5M	10%	0.33W	Mullard	CR25
A1R94	Res.var.10K	10%	0.75W	Spectrol-Reliance	43P
A1R95	Res.10 ohms	2%	0.4W	Mullard	MR25
A1R96	Res.47K	2%	0.4W	Mullard	MR25
A1R97	Res.220 ohms	2%	0.4W	Mullard	MR25
A1R98	Res.100K	2%	0.4W	Mullard	MR25
A1R99	Res.2.80K	1%	1/8W	Holco	H8/50
A1R100	Res.2.80K	1%	1/8W	Holco	H8/50
A1R101	Res.10 ohms	2%	0.4W	Mullard	MR25
A1R102	Res.2.80K	1%	1/8W	Holco	H8/50
A1R103	Res.1.40K	1%	1/8W	Holco	H8/50
A1R104	Res.100K	2%	0.4W	Mullard	MR25
A1R105	Res.15K	2%	0.4W	Mullard	MR25
A1R106	Res.1K	2%	0.4W	Mullard	MR25
A1R107	Res.15K	2%	0.4W	Mullard	MR25
A1R108	Res.100 ohms	2%	0.4W	Mullard	MR25
A1R109	Res.1.5K	2%	0.4W	Mullard	MR25
A1R110	Res.100K	2%	0.4W	Mullard	MR25
A1R111	Res.1.5K	2%	0.4W	Mullard	MR25
A1R112	Res.100 ohms	2%	0.4W	Mullard	MR25
A1R113	Res.3.32K	1%	1/8W	Holco	H8/50
A1R114	Res.2.15K	1%	1/8W	Holco	H8/50
A1R115	Res.2.55K	1%	1/8W	Holco	H8/50
A1R116	Res.8.2K	2%	0.4W	Mullard	MR25
A1R117	Res.3.16K	1%	1/8W	Holco	H8/50
A1R118	Res.4.7K	2%	0.4W	Mullard	MR25
A1R119	Res.100K	2%	0.4W	Mullard	MR25
A1R120	Res.1K	2%	0.4W	Mullard	MR25
A1R121	Res.1.5K	2%	0.4W	Mullard	MR25
A1R122	Res.470K	5%	0.33W	Mullard	CR25
A1R123	Res.100 ohms	2%	0.4W	Mullard	MR25

Table 5-5. Assembly A2, Power Supplies 6700/202

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A2C1	Cap.0.1uF	±20%	250V	I.T.T.	MPT/1
A2C2	Cap.2200uF	−10/+75%	25V	Sprague	39D228G025
A2C3	Cap.100uF	−10/+50%	25V	Erie	20100 series
A2C4	Cap.Tant.10uF	±20%	35V	I.T.T.	TAG 10/35
A2C5	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A2C6	Cap.39pF	±10%	200V	Vitramon	CK05BX390K
A2C7	Cap.56pF	±10%	200V	Vitramon	CK05BX560K
A2C8	Cap.150pF	±10%	200V	Vitramon	CK05BX151K
A2C9	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A2C10	Cap.47uF	−10/+50%	25V	Erie	20100 series
A2C11	Cap.0.22uF	±10%	100V	Mullard	344 25224
A2C12	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A2C13	Cap.4700pF	±10%	200V	Vitramon	CK06BX472K
A2C14	Cap.100uF	−10/+50%	25V	Erie	20100 series
A2C15	Cap.2200uF	−10/+75%	25V	Sprague	39D228G025
A2C16	Cap.100uF	−10/+50%	25V	Erie	20100 series
A2C17	Cap.220pF	±10%	200V	Vitramon	CK05BX221K
A2C18	Cap.Tant.10uF	±20%	35V	I.T.T.	TAG 10/35
A2C19	Cap.150pF	±10%	200V	Vitramon	CK05BX151K
A2C20	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A2C21	Cap.39pF	±10%	200V	Vitramon	CK05BX390K
A2C22	Cap.56pF	±10%	200V	Vitramon	CK05BX560K
A2C23	Cap.47uF	−10/+50%	25V	Erie	20100 series
A2C24	Cap.0.1uF	±20%	250V	I.T.T.	MPT/1
A2C25	Cap.4000uF	−10/+75%	15V	Sprague	39D408G015
A2C26	Cap.1000pF	±10%	200V	Vitramon	CK05BX102K
A2C27	Cap.56pF	±10%	200V	Vitramon	CK05BX560K
A2C28	Cap.150pF	±10%	200V	Vitramon	CK05BX151K
A2C29	Cap.39pF	±10%	200V	Vitramon	CK05BX390K
A2C30	Cap.100pF	±10%	200V	Vitramon	CK05BX101K
A2C31	Cap.47uF	−10/+50%	25V	Erie	20100 series
A2C32	Cap.0.01uF	±10%	200V	Vitramon	CK06BX103K
A2CR1	Bridge Rect.			Power Comp's	BR82D
A2CR2	Diode			Mullard	IN914
A2CR3	Diode			Mullard	IN914
A2CR4	Diode			Mullard	IN914
A2CR5	Diode,Zener	T.C.=5ppm	6.2V	Transitron	IN829
A2CR6	Diode			Mullard	IN914
A26R7	Diode			Mullard	IN914
A2CR8	Diode			Mullard	IN914
A2CR9	Diode			Mullard	IN914
A2CR10	Bridge Rect.			Power Comps.	BR82D
A2CR11	Diode			Mullard	IN914
A2CR12	Diode			Mullard	IN914
A2CR13	Diode,Zener		6.2V	Mullard	BZY88C6V2
A2IC1	Integrated Circuit			Motorola	MC1437L
A2IC2	Integrated Circuit			Motorola	MC1437L

Table 5-5. Assembly A2, Power Supplies 6700/202 continued

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A2Q1	Transistor			Motorola	MJ 1000
A2Q2	Transistor			Motorola	2N 4403
A2Q3	Transistor			Motorola	2N 4403
A2Q4	Transistor			Motorola	2N 4401
A2Q5	Transistor			Motorola	MJ 900
A2Q6	Transistor			Motorola	2N4403
A2Q7	Transistor			Motorola	2N4403
A2Q8	Transistor			Motorola	2N4403
A2Q9	Transistor			Motorola	2N4403
A2Q10	Transistor			Motorola	MJ900
A2Q11	Transistor			Motorola	2N4403
A2Q12	S.C.R.			Motorola	2N4441
A2R1	Res.820 ohms	2%	0.4W	Mullard	MR25
A2R2	Res.1.8K	2%	0.4W	Mullard	MR25
A2R3	Res.1K	2%	0.4W	Mullard	MR25
A2R4	Res.2K	2%	0.4W	Mullard	MR25
A2R5	Res.100 ohms	2%	0.4W	Mullard	MR25
A2R6	Res.1K	2%	0.4W	Mullard	MR25
A2R7	Res.0.47 ohm	5%	3W	C.G.S.	C3A
A2R8	Res.1.2K	2%	0.4W	Mullard	MR25
A2R9	Res.14.7K	1%	1/8W	Holco	H8/50
A2R10	Res.Var.500 ohms	10%	0.75W	Spectrol-Reliance	43P
A2R11	Factory selected	1%	1/8W	Holco	H8/50
A2R12	Res.4.7K	2%	0.4W	Mullard	MR25
A2R13	Res.1.21K	1%	1/8W	Holco	H8/50
A2R14	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A2R15	Res.3.00K	0.05%	0.1W	ERG	EE-0.10-3K-AC4
A2R16	Res.1.2K	2%	0.4W	Mullard	MR25
A2R17	Res.2.00K	0.05%	0.1W	ERG	EE-0.10-2K-AC4
A2R18	Res.1.5K	2%	0.4W	Mullard	MR25
A2R19	Res.220 ohms	2%	0.4W	Mullard	MR25
A2R20	Res.10 ohms	2%	0.4W	Mullard	MR25
A2R21	Res.47 ohms	2%	0.5W	Mullard	MR30
A2R22	Res.4.7K	2%	0.4W	Mullard	MR25
A2R23	Res.1K	2%	0.4W	Mullard	MR25
A2R24	Res.2K	2%	0.4W	Mullard	MR25
A2R25	Res.1K	2%	0.4W	Mullard	MR25
A2R26	Res.100 ohms	2%	0.4W	Mullard	MR25
A2R27	Res.0.47 ohms	5%	3W	C.G.S.	C3A
A2R28	Res.1.2K	2%	0.4W	Mullard	MR25
A2R29	Res.10 ohms	2%	0.4W	Mullard	MR25
A2R30	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A2R31	Res.0.47 ohm	5%	3W	C.G.S.	C3A
A2R32	Res.1.8K	2%	0.4W	Mullard	MR25
A2R33	Res.1.2K	2%	0.4W	Mullard	MR25
A2R34	Res.15.0K	1%	1/8W	Holco	H8/50
A2R35	Res.3.3K	2%	0.4W	Mullard	MR25
A2R36	Res.5.11K	1%	1/8W	Holco	H8/50
A2R37	Res.100 ohms	2%	0.4W	Mullard	MR25

Table 5-6. Assembly A3, Remote Programming (Option–01) 6700/203

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A3CR1	Diode			Mullard	IN914
A3IC1	Integrated Circuit			Motorola	MC7475P
A3IC2	Integrated Circuit			Motorola	MC7475P
A3IC3	Integrated Circuit			Motorola	MC7475P
A3IC4	Integrated Circuit			Motorola	MC834P
A3IC5	D-A Converter			Zeltex	ZD433
A3K1	Relay			Potter & Brumfield	JRM1049
A3Q1	Transistor			Motorola	2N4401
A3R1	Res.var.10K	10%	0.75W	Spectrol-Reliance	43P
A3R2	Res.var.10K	10%	0.75W	Spectrol-Reliance	43P
A3R3	Res.var.500 ohms	10%	0.75W	Spectrol-Reliance	43P
A3R4	Res.5.11K	1%	1/8W	Holco	H8/50
A3R5	Res.6.8K	2%	0.4W	Mullard	MR25
A3R6	Res.6.8K	2%	0.4W	Mullard	MR25
A3R7	Res.4.7K	2%	0.4W	Mullard	MR25

Table 5-7. Assembly A4, Mother Board 6700/204

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A4A1	Sweep Function Switch Assembly			Marconi Instruments	Drg.6700/012
comprising					
A4A1S1	Swp.Fn.Switch			M.I.	Drg.6700/033
A4A1R1	Res.7.50K	0.05%	0.1W	ERG	EE-0.10-7.5K-AC4
A4A2	Sweep Time (secs) Switch Assembly			M.I.	Drg.6700/013
comprising					
A4A2S1	Swp.Time Switch			M.I.	Drg.6700/031
A4A2R1	Res.Var.10K, lin.	20%	1/2W		Part of 6700/031
A4A2R2	Res.150K	2%	0.4W	Mullard	MR25
A4A2R3	Res.1.5M	10%	0.33W	Mullard	CR25
A4A2R4	Res.820 ohms	2%	0.4W	Mullard	MR25
A4A2C1	Cap.0.1uF	20%	250V	Mullard	C280AEP100K
A4A2C2	Cap.Tant.1uF	10%	20V	Union Carbide	K1J20K
A4A2C3	Cap.Tant.10uF	10%	20V	Union Carbide	K10J20K
A4A2C4	Cap.Tant.100uF	10%	20V	Union Carbide	K100J20K
A4A3	Sweep Trigger Switch Assy.			Marconi Instruments	Drg.6700/015
comprising					
A4A3S1	Swp.Trig. Switch			M.I.	Drg.6700/032
A4A3R1 (Marker amp)	Res.Var.10K, lin.	20%	1/2W		Part of 6700/032
A4C1	Cap.0.22uF	10%	250V	Erie	51012 series
A4C2	Cap.0.22uF	10%	250V	Erie	51012 series
A4C3	Cap.0.1uF	10%	250V	Erie	51012 series
A4C4	Cap.0.1uF	10%	250V	Erie	51012 series
A4C5	Cap.0.1uF	10%	250V	Erie	51012 series
A4C6	Cap.0.047uF	20%	250V	Erie	61013 series
A4C7	Cap.22uF	−10/+50%	63V	Erie	20100 series
A4C8	Cap.1100uF	−10/+75%	50V	Sprague	39D118G050HP4
A4C9	Cap.1000uF	−10/+50%	63V	Erie	21100 series
A4C10	Cap.1100uF	−10/+75%	50V	Sprague	39D118G050 HP4
A4C11	Cap.47uF	−20/+50%	315V	Erie	21100 series
A4C12	Cap.0.1uF	10%	100V	Vitramon	CK06BX104K
A4CR1	Diode,zener	5%	6.2V	Mullard	BZY88-C6V2
A4CR2	Diode			Mullard	IN914
A4CR3	Diode			Mullard	IN914
A4CR4	Diode			I.T.T.	IN4003
A4CR5	Diode			I.T.T.	IN4003
A4CR6	Diode			I.T.T.	IN4003
A4CR7	Bridge Rect.			Power Comp's	BR82D
A4CR8	Bridge Rect.			Power Comp's	BR82D
A4CR9	Bridge Rect.			Power Comp's	BR82D

Table 5-7. Assembly A4, Mother Board 6700/204 continued

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A4J1	Connector, 18+18 pin			Amphenol	225-21821-111
A4J2	Connector, 18+18 pin			Amphenol	225-21821-111
A4J3	Connector 18+18 pin			Amphenol	225-21821-111
A4J4	Connector, 18+18 pin			Amphenol	225-21821-111
A4K1	Relay			Adams & Westlake	ARA1-13006L
A4Q1	Transistor			Motorola	2N4401
A4Q2	Transistor			Motorola	2N4401
A4R1	Res.15K	2%	0.4W	Mullard	MR25
A4R2	Res.15K	2%	0.4W	Mullard	MR25
A4R3	Res.180 ohms	2%	0.5W	Mullard	MR30
A4R4	Res.10K	2%	0.4W	Mullard	MR25
A4R5	Res.100 ohms	2%	0.4W	Mullard	MR25
A4R6	Res.330 ohms	2%	0.5W	Mullard	MR30
A4R7	Res.4.7 ohms	5%	0.33W	Mullard	CR25
A4R8	Res.220 ohms	2%	0.4W	Mullard	MR25
A4R9	Res.4.7K	2%	0.4W	Mullard	MR25
A4R10	Res.7.50K	0.05%	0.1W	ERG	EE-0.10-7.5K-AC4
A4R11	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A4R12	Res.10.00K	0.05%	0.1W	ERG	EE-0.10-10K-AC4
A4R13	Res.15.00K	0.05%	0.1W	ERG	EE-0.10-15K-AC4
A4R14	Res.10K	2%	0.4W	Mullard	MR25
A4R15	Res.68K	2%	0.4W	Mullard	MR25
A4R16	Res.10K	2%	0.4W	Mullard	MR25
A4R17	Res.1M	5%	0.33W	Mullard	CR25
A4R18	Res.147K	1%	1/8W	Holco	H8/50
A4R19	Res.680 ohms	2%	0.5W	Mullard	MR30
A4R20	Res.22 ohms	2%	0.4W	Mullard	MR25
A4R21	Res.2.55K	1%	1/8W	Holco	H8/50

Table 5-8. Assembly A5, Trimmer Board 6700/007

Reference Designation	Description/ Value	Tolerance	Rating	Supplier/ Manufacturer	Manufacturer's Type
A5R1	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R2	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R3	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R4	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R5	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R6	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R7	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R8	Res.var.10 ohms	10%	1W	Spectrol-Reliance	CW15
A5R9	Res.100K	1%	1/8W	Holco	H8/50
A5R10	Res.100K	1%	1/8W	Holco	H8/50
A5R11	Res.100K	1%	1/8W	Holco	H8/50
A5R12	Res.100K	1%	1/8W	Holco	H8/50

SECTION 6
CIRCUIT DIAGRAMS

6.1 INTRODUCTION

This section contains the circuit diagrams and component identification illustrations for Assemblies A1, A2, A3, and A4. Component identification for A5 is included as part of Figure 5-7. Figure 6-2 provides an overall view of these assemblies and also contains the circuit diagram for the Mainframe, A4 and A5.

6.2 LIST OF FIGURES

The following list shows the figure number, figure title and page number for each figure.

Figure	Title	Page
6-1	Assembly A4, Motherboard Component Location	6-2
6-2	Type 6700A Overall Circuit Diagram	6-3/6-4
6-3	Assembly A1, Sweep and Marker Generator Component Identification	6-6
6-4	Sawtooth and Limiter Circuit Diagram (part of A1)	6-7/6-8
6-5	Sweep Amplifier Circuit Diagram (part of A1)	6-9/6-10
6-6	Marker and Square Wave Generator Circuit Diagram (part of A1)	6-11
6-7	Assembly A2, Power Supply Component Location	6-12
6-8	Assembly A2, Power Supply Circuit Diagram	6-13
6-9	Assembly A3, Remote Programming Component Location	6-14
6-10	Assembly A3, Remote Programming Circuit Diagram	6-15/6-16

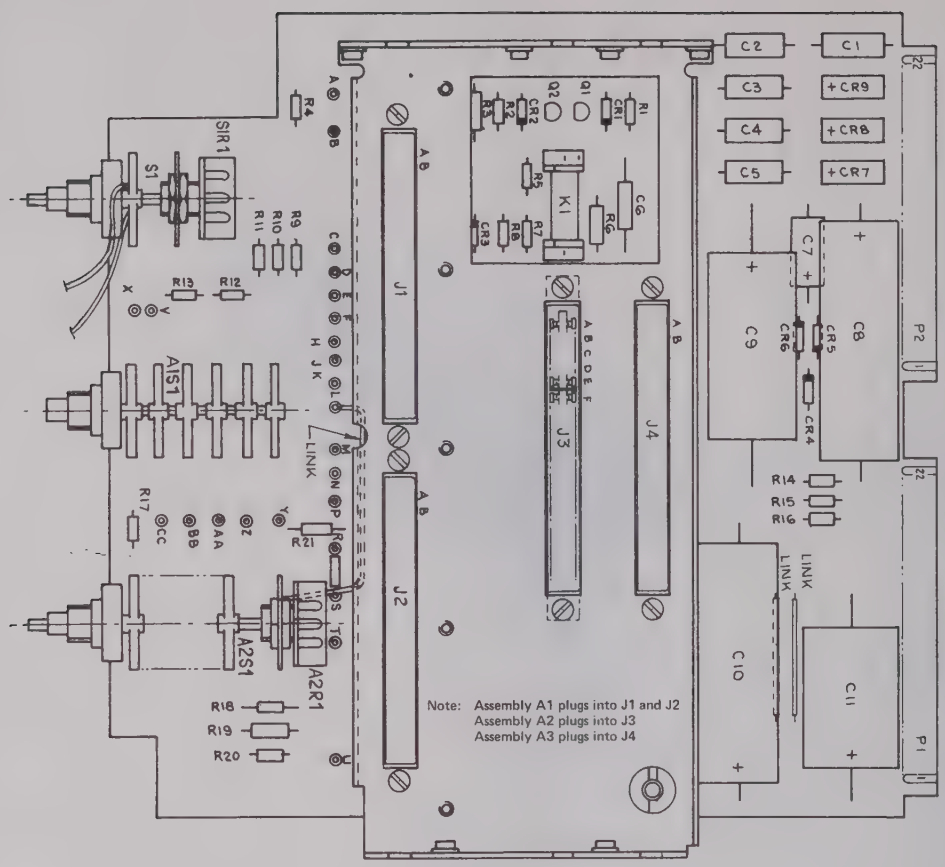


Figure 6-1. Assembly A4, Motherboard Component Location

B1→A3-4
Y1→A3-1
G1→A3-6
B2→A3-3
Y2→A3-2
G2→A3-5

ALTERNATIVE LOCATIONS FOR QUICK DISCONNECTS WHEN REMOTE PROGRAMMING P.C. BOARD A3 IS FITTED.

TB2-5 Y2 YELL
TB2-6 G2 GREY
B2 BROWN
TB2-4

TB2
EXT SWEEP INPUT
J3

USE WITH MB ONLY SEE SPECIFIC MB OPTION FOR VALUE

EXTERNAL JUMPERS (4 POSITIONS) NORMALLY CONNECTED

TB1

YELL
BROWN
GREY
G1

J12 REMOTE PROGRAMMING CONNECTOR

REMOTE RF ON/OFF FROM J8-9

TO A4J3-J
TO A4J3-P
TO A4J3-T

A4
A3 OPTION CARD 30502D

TO A4J4
TO A4P1
A4J3-S
A4J3-L (+15 PWR)
A4J3-F (-15V REF)

-10V
TO A4J3-R

P/O A1
SAWTOOTH & LIMITER

TO A4J1

S9
TRIGGER
A4S1
SINGLE SWEEP
AUTO
LINE
EXT

EXTERNAL TRIGGER
J5
A4P1-22
A4C2 .22uf
A4R4 10K
A4C1 .22uf
A4J3-16 +5V
A4R3 180, ½W
A4R2 15K
A4J1-11
A4CR2 1N483B
A4Q2 2N4401
A4CR1
A4Q1 2N4401
A4R1 15K
SWEEP ON
DS2
-5V

A4A2C1, .1uf, 250V
A4A2C2, 1uf, 20V
A4A2C3, 10uf, 20V
A4A2C4, 100uf, 20V
A4A2R2 150K
A4A2R3 1.5MEG 10% ½W
A4A2R4 A4A2R1 10K VARIABLE
A4A2R4 820
A4A2S1 SEC 1
A4A2S1 SEC 5
A4A2S1 SEC 2
MAN
A4R18 147K 1%, ½W
-15V REF
-15V
A4P1-4

SWEEP TIME (SEC)
.01
.1
1
10
MAN
+15V PWR

R13 4.7K
R7 4.7K
BLANKING OUTPUT
J2
A4P2-21
OFF ON
S4
A4P1-14
RF DURING RETRACE
PEN LIFT
J9
A4P2-10
A4P2-9

A4CR5
A4CR6
A4C7 22uf 63V
A4C9 1000uf, 63V
+50V
A4CR3
A4R7 4.7, 5% 5W
A4R5 100
A4C6 .047uf 100V
IN483B
A4R8 220, 5%
A4R6 330, ½W
A4K1
A4J3-3 -15V
A4P1-E
A4J1-D
A4P1-C
A4P1-D
A4J4-14
A4P2

T1
F1
DS1
S2
115V
230V
MAINS LINE INPUT J10
S1
POWER ON
TO J8-3

P/O A4
CR9 C3 .1uf C8 1100uf 50V R16 10K
CR8 C4 .1uf C10 1100uf 50V R14 10K
CR7 C5 .1uf C11 47uf 315V R15 10K
A4P2

TO J8-6/7
115V.A.C.
J14
P14
FAN

TO A4J3
A4J4-10
A4J4-8
A4J4-13
A4J4-16
+5V
A4P1-A
A4P1-F
A4P1-H
A4P1-J
-15V REF
-15V PWR
A4J2-V
A4J2-17
A2 POWER SUPPLIES
+15V PWR
-10V REF
A4J4-14
A4P1-R
+15V REF
TO A4P1-C
TO A4P1-D

P/O A1
SWEEP AMPLIFIER

TO A4J1

A5TP3
A5-5
A5R12 100K
A5R8 10, ½W
A5-3
A5R1 1000, 5%, 2W
A5-1
A5R7 10, ½W
A5-2
A5TP6

SYM MARKERS
58
RELATIVE
CALIBRATED

A4P1-3
A4P1-9
A4P1-10
A4R17 1MEG 5%
-15V

SWEEP OUT
SWEEP OUTPUT
AMP
RG 2200
RH 2200

CW M1
SYM M1
F1-F2
M1-M2
EXT/M1
P/O A4A1S1 SEC 1
A4J1
A4R12, 10K 0.05% ⅛W
P/O A4A1S1 SEC 5
A4R9 4700
A4R11 10K, 0.05% ⅛W
A4R10 7500 0.05%, ⅛W
P/O A4A1S1 SEC 6
P/O A4A1S1 SEC 3
P/O A4A1S1 SEC 4
P/O A4A1S1 SEC 2
P/O A4A1S1 SEC 3
P/O A4A1S1 SEC 5
P/O A4A1S1 SEC 1
P/O A4A1S1 SEC 6
P/O A4A1S1 SEC 4
P/O A4A1S1 SEC 3
A4R1 7500
A4R19 680 1W
A4R20 22
A4R19 15K .05% ½W
+15v
-15V
+5V
A4P1-15
EXT. INPUT
J11
A5-17
A5TP1
A5R11 100K, 1% ⅛W
A5R5 10, ½W
A5-11
A5-4
R2 1000, 5%, 2W
A5R6 10, ½W
A5TP5
A5-6
A5-7
A5-8
TO A5-17
A5R2 10
A5-21
A5R1 10, 10% ½W
A5-18
A5R9 100K 1% ½W
A5-19
A5-20
A5TP7
FZ
R4, 1000 5%, 2W
A5R4 10, ½W
A5-16
A5R10 100K 1% ½W
A5-13
M2
R3 1000 5%, 2W
A5R3 10, ½W
A5-15
A5TP2
A5TP8
A5-12

SWEEP FUNCTION
SWEEP RESPONSE TIME
5S
10
FAST
AUTO
A4P1-8
A4P1-7
J8-20

P/O A1
MARKER & Z GENERATOR

A4J2
+15 PWR
+15 REF
-15V REF
-15V PWR
A4J1-13 (+15V PWR)
A4P1-13
A4P1-12
A4C12 1uf, 100V
A4R21 2.55K 1%, ⅛W
R5 1000
1KHz
ON
S5
RF
MARKER
R8 4.7K
R12 4.7K
J4
VIDEO OUTPUT
MARKER AMPLITUDE
A4S1R1 10K
TO A4A1S1 SEC 4

TO A4J3-N
TO A4J3-M
A4P1-D

A4J3-16 → A4P1-A
A4J3-5 → A4P1-B
J10-3
A4P2-K
A4P2-Y
J 14-E
J 14-A
A4P1-16
TO J12-19
A4P1-C
A4P2-13
A4P2-11
A4P2-15
A4P2-17
A4J3-K
A4J3-9
A4J3 E → A4P1-H
A4J3 D → A4P1-J
A4P1-F
S6-3
A4P1-E
A4P1-J
A4P1-11

J8
1 +5v
2 5v RETURN
3
4 −) UNREGULATED INPUT
5 +) TO BIAS SUPPLY
6 } 115V. AC.
7 }
8 M.B. RELAY SIGNAL
9 REMOTE R.F. ON/OFF
10 NOT USED
11 A4 "ON" SIGNAL
12 −15v REF #2
13 NULL } SYMMETRICAL
14 OUTPUT } RESISTOR
15 NULL } PROPORTIONAL
16 OUTPUT } SWEEP RESISTOR
17
18 TUNING VOLTAGE
19 −) UNREGULATED
20 +) 100v
21
22 NOT USED
23
24 + UNREGULATED INPUT
25 −) TO YIG SUPPLY
26 NOT USED
27 BLANKING
28 SWEEP RESPONSE TIME
29 +15v PWR
30 −15v PWR
31 MARKER (-) BLANKING
32 SWEEP HESITATION
33
34 +15V REF
35 −15V REF #1
36

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a. ALL RESISTOR VALUES ARE IN OHMS AND ARE 2%, ¼W.
   b. ALL CAPACITORS HAVE A WDCV OF 200V
2. ENCIRCLED LETTER INDICATES QUICK DISCONNECT TERMINAL;
   ▽ INDICATES SIGNAL GROUND;
   ▽ INDICATES POWER GROUND.
3. ALL GROUNDS ON ASSEMBLY A2 ARE CONNECTED TOGETHER.

Figure 6-2. Type 6700A, Overall Circuit Diagram

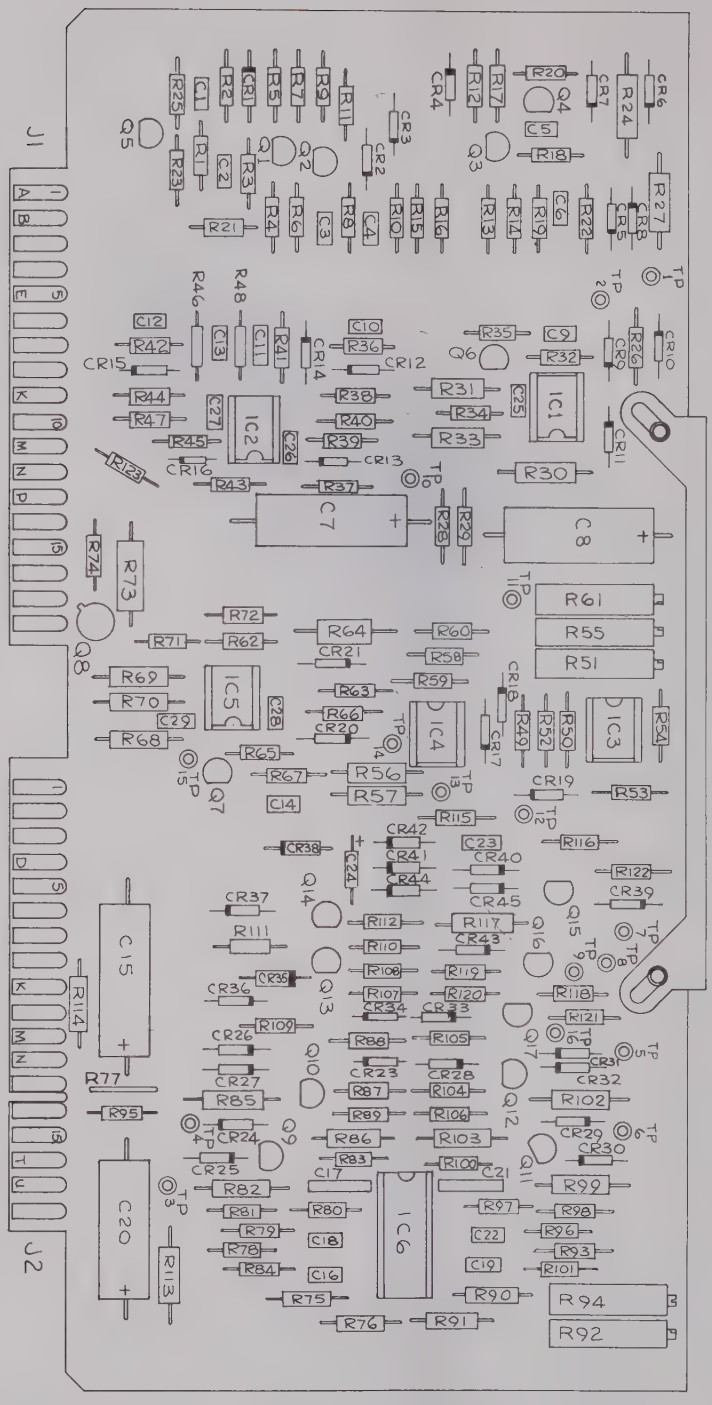


Figure 6-3. Assembly A1, Sweep and Marker Generator Component Identification

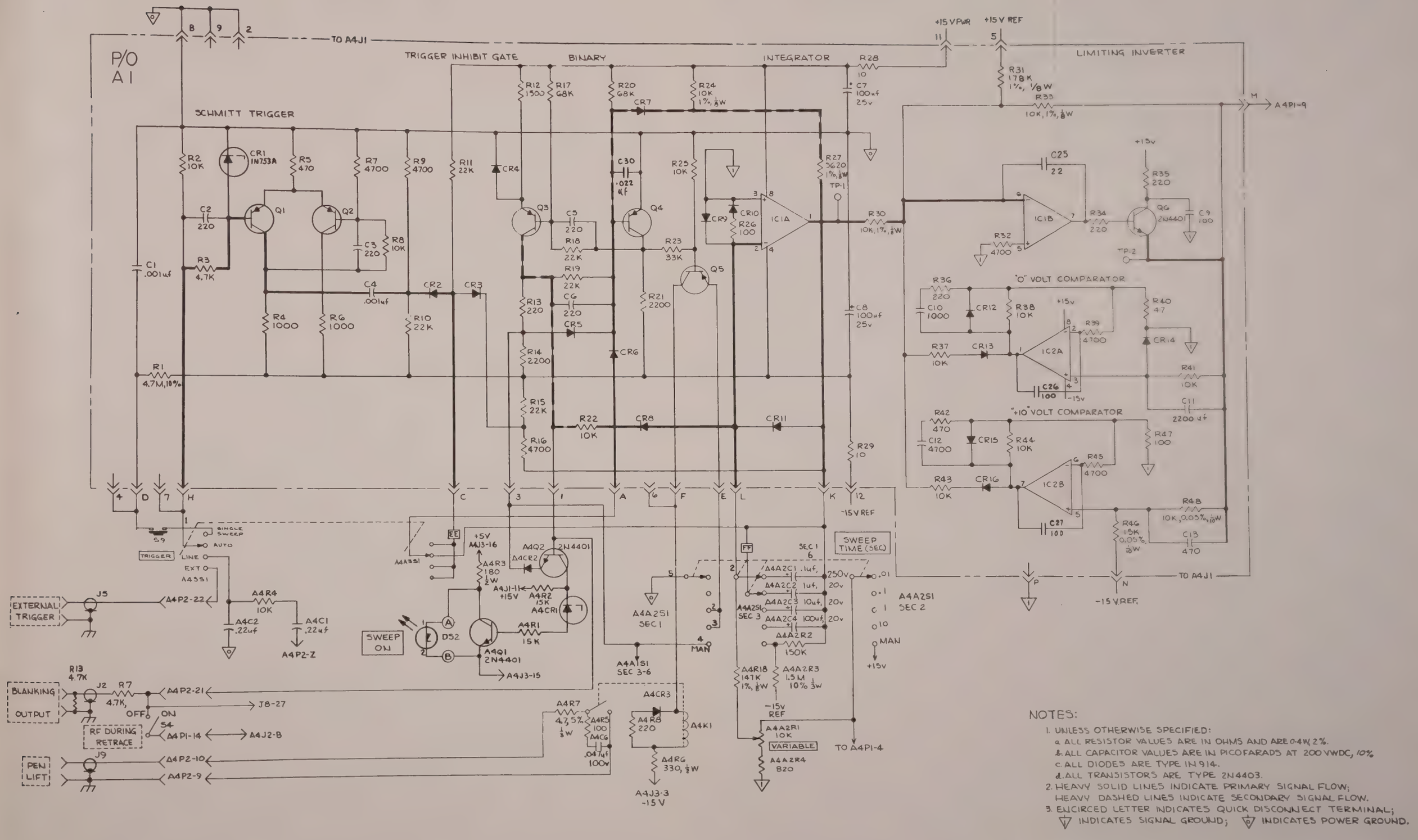
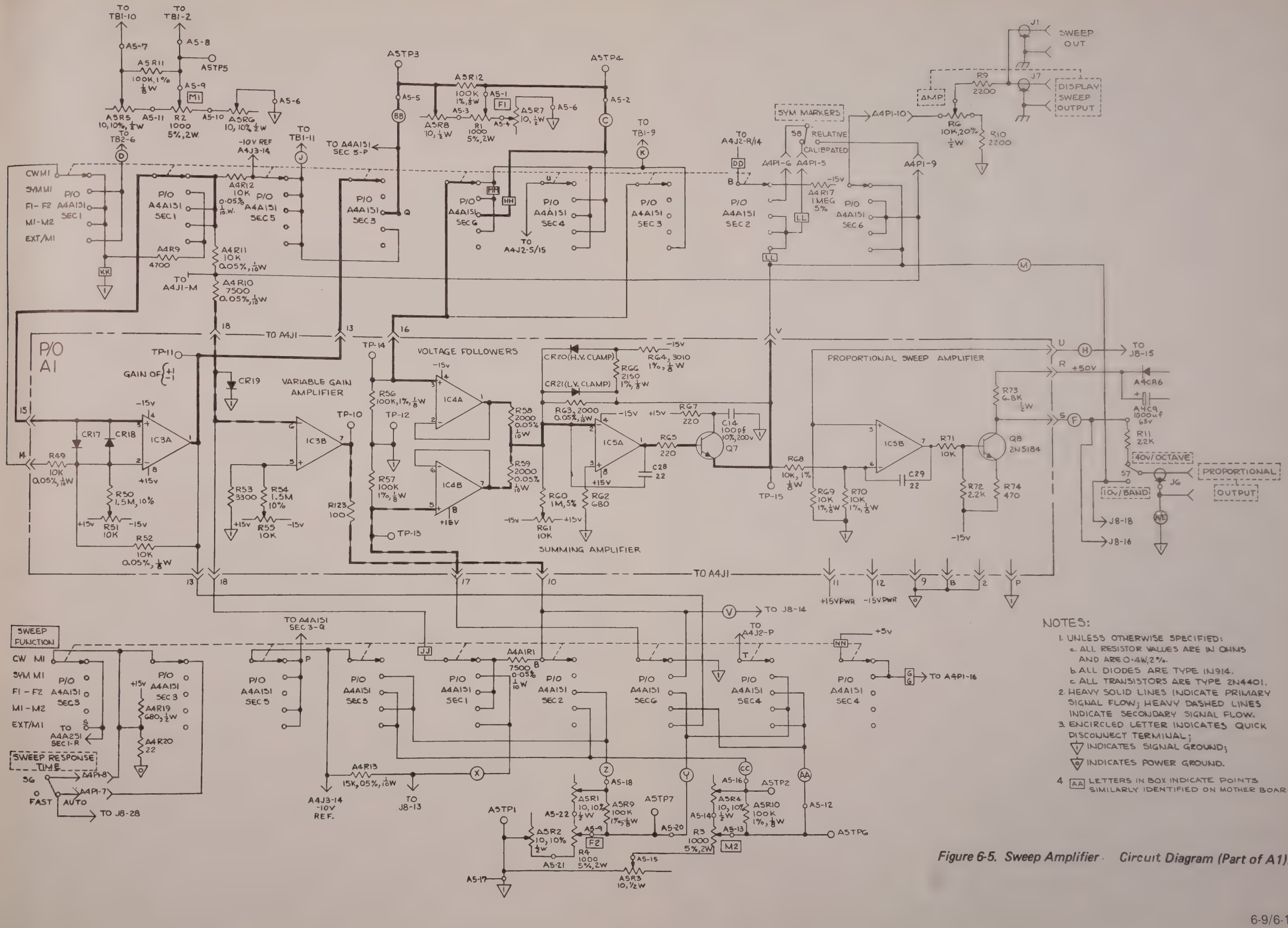


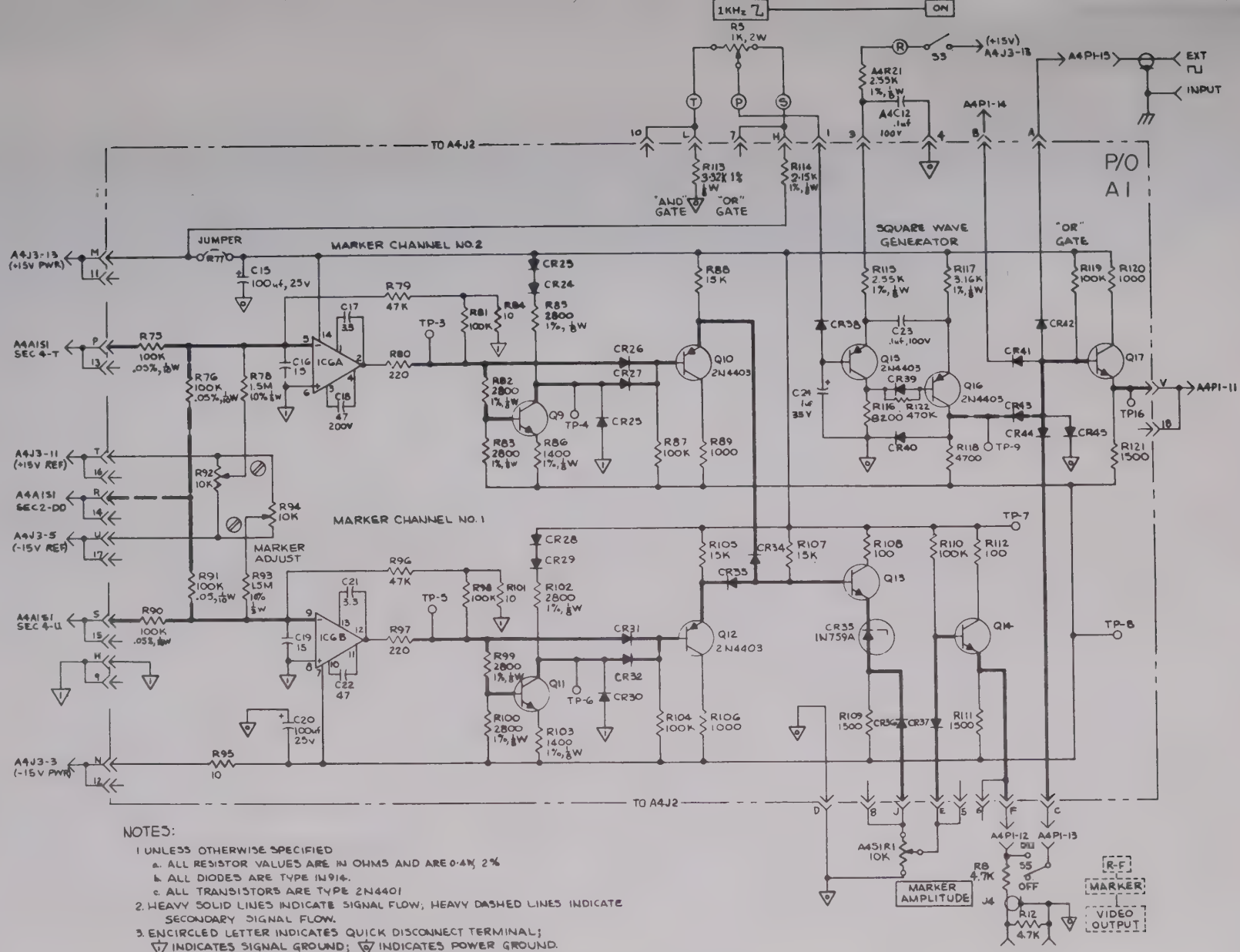
Figure 6-4. Sawtooth and Limiter Circuit Diagram (Part of A1).



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a. ALL RESISTOR VALUES ARE IN OHMS AND ARE 0·4W, 2%.
   b. ALL DIODES ARE TYPE IN914.
   c. ALL TRANSISTORS ARE TYPE 2N4401.
2. HEAVY SOLID LINES INDICATE PRIMARY SIGNAL FLOW; HEAVY DASHED LINES INDICATE SECONDARY SIGNAL FLOW.
3. ENCIRCLED LETTER INDICATES QUICK DISCONNECT TERMINAL;
   ▽ INDICATES SIGNAL GROUND;
   ⊽ INDICATES POWER GROUND.
4. [AA] LETTERS IN BOX INDICATE POINTS SIMILARLY IDENTIFIED ON MOTHER BOARD

Figure 6-5. Sweep Amplifier Circuit Diagram (Part of A1).



NOTES:

1. UNLESS OTHERWISE SPECIFIED
   a. ALL RESISTOR VALUES ARE IN OHMS AND ARE 0.4W, 2%
   b. ALL DIODES ARE TYPE 1N914.
   c. ALL TRANSISTORS ARE TYPE 2N4401
2. HEAVY SOLID LINES INDICATE SIGNAL FLOW; HEAVY DASHED LINES INDICATE SECONDARY SIGNAL FLOW.
3. ENCIRCLED LETTER INDICATES QUICK DISCONNECT TERMINAL; ▽ INDICATES SIGNAL GROUND; ▽ INDICATES POWER GROUND.
4. ALL CAPACITOR VALUES ARE IN PICOFARADS AT 200 VWDC, 10%.

Figure 6-6. Marker and Square Wave Generator Circuit Diagram (Part of A1).

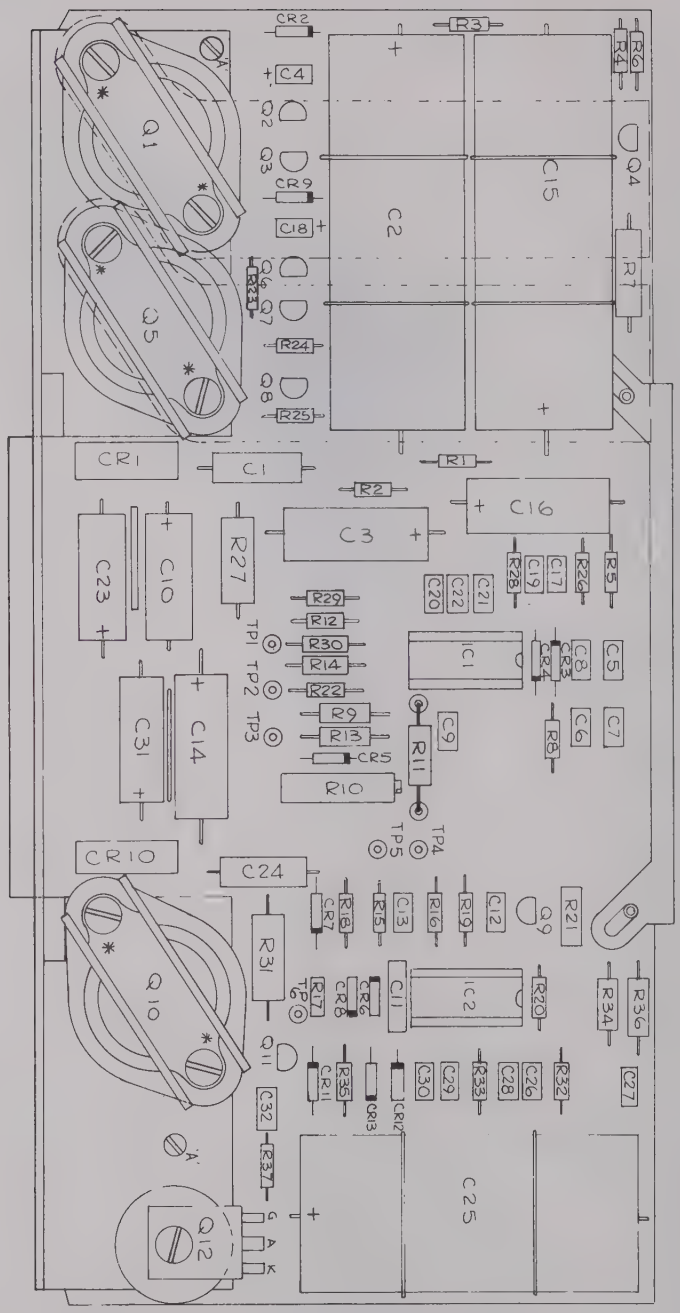


Figure 6-7. Assembly A2, Power Supply Component Identification.

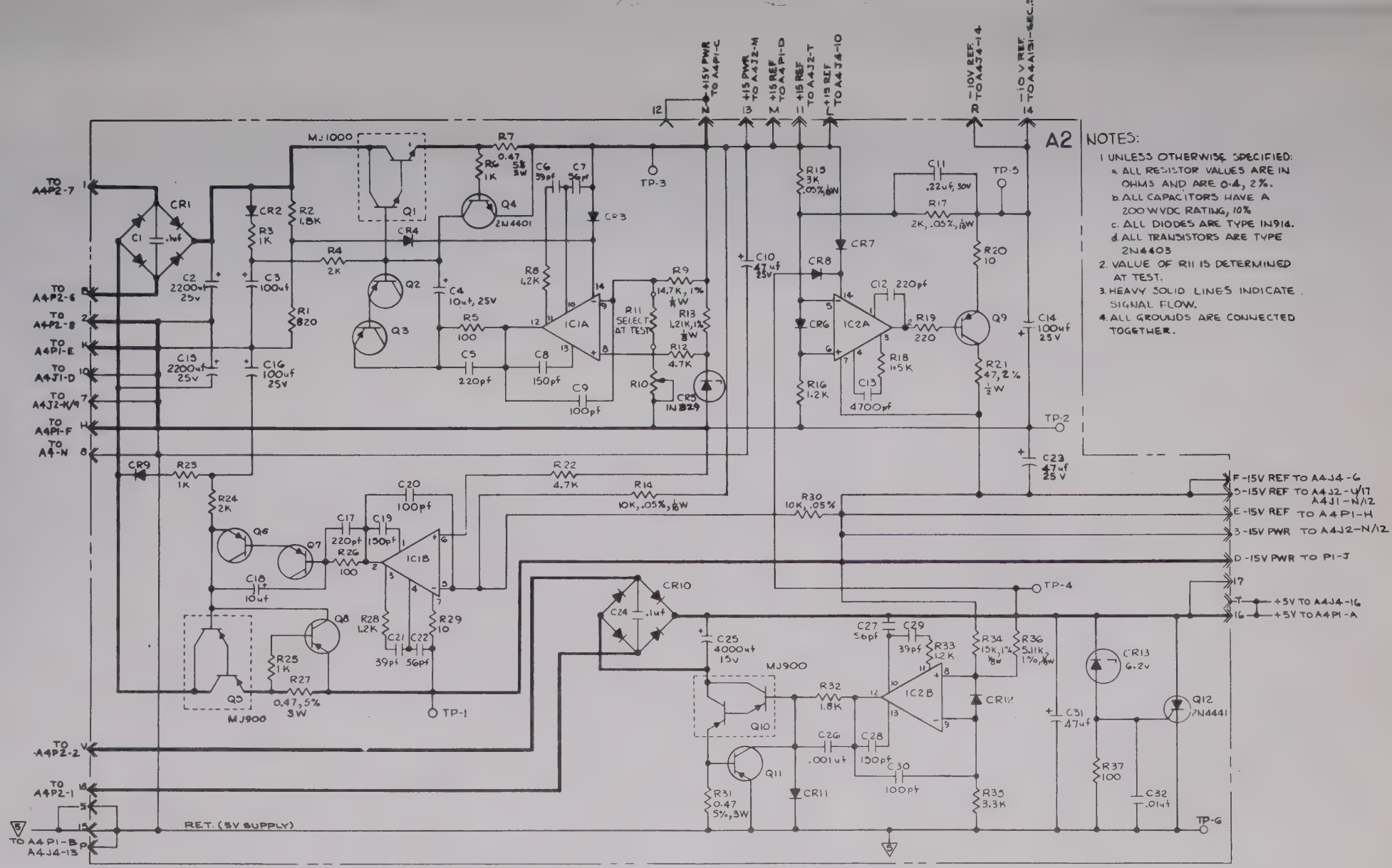


Figure 6-8. Assembly A2, Power Supply Circuit Diagram.

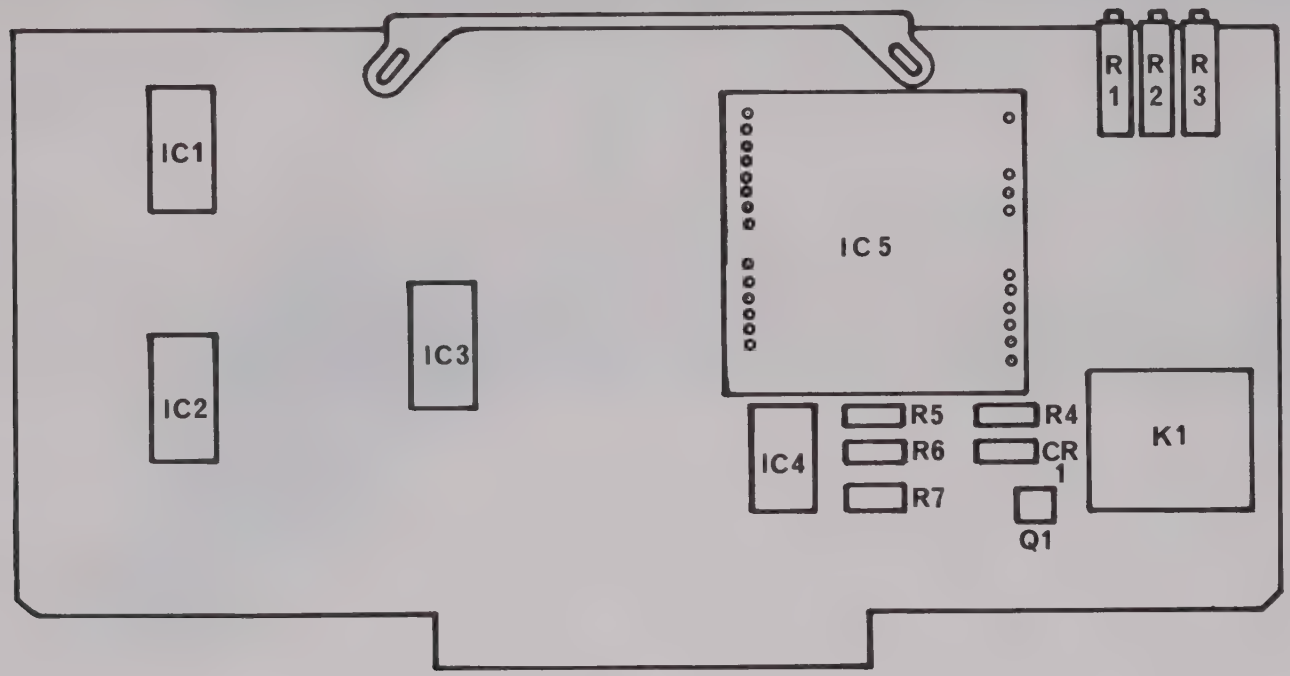


Figure 6-9. Assembly A3, Remote Programming Component Identification.

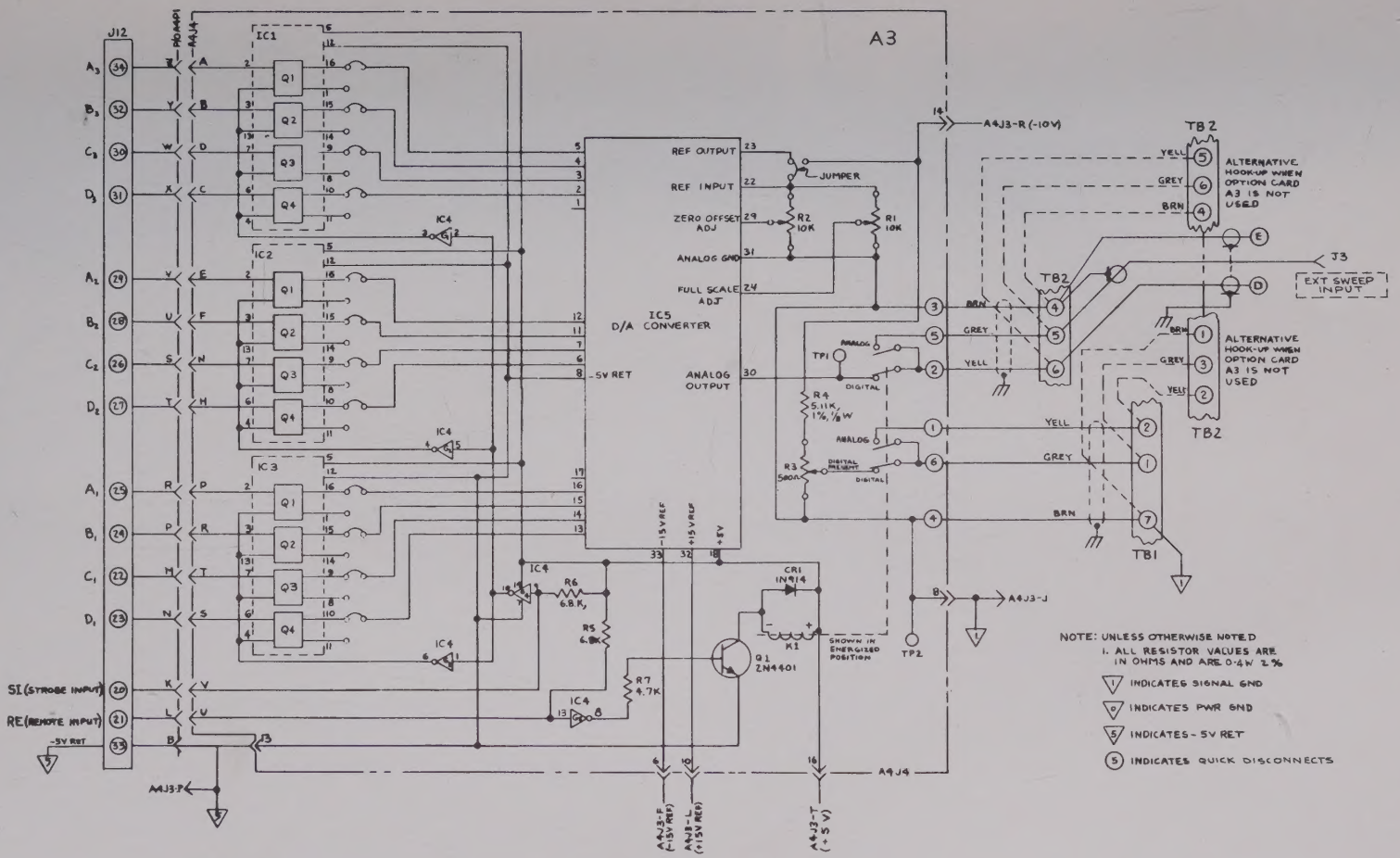


Figure 6-10. Assembly A3, Remote Programming Circuit Diagram.

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